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(54) Title: METHOD, SYSTEM, AND APPARATUS FOR AUTOMATING THE CREATION OF CUSTOMER-CENTRIC INTERFACE

(57) Abstract: A method, system, and apparatus for automating the creation of customer-centric interfaces includes an IVR system and a computer system automatically creating a customer-centric interface design. A plurality of opening statements are collected and analyzed in order to determine the customers' terminology, the tasks for which the customers contact the interface, and how the tasks are related. Analysis and categorization of the customer opening statements (using one or more rules), the tasks, and the task relationships allows for menu prompts and dialog exchanges within the interface to be in the customers own terminology and arranged in an order familiar to the customers. Furthermore, a plurality of personas are available to interact with the customers in accordance with the customers' personality or demeanor. The performance of the customer-centric interface is tested whereby the test results are automatically analyzed and the customer-centric interface is modified for optimal performance.

METHOD, SYSTEM, AND APPARATUS FOR AUTOMATING
THE CREATION OF CUSTOMER-CENTRIC INTERFACE

TECHNICAL FIELD OF THE INVENTION

The present invention relates generally to interface
designs, and more specifically relates to a system and
5   method for implementing customer-centric interfaces.

BACKGROUND OF THE INVENTION

Every year, company service centers typically
receive numerous telephone calls from customers seeking
assistance with particular tasks. The customers often
10   speak with customer service representatives (CSR) to
complete their tasks. Because of the cost associated
with CSR time, companies are switching over to automated
systems such as interactive voice response (IVR) systems
where IVR systems answer the customer phone calls and
15   direct the customer phone calls to the correct service
center using one or more menus of options. The IVR
systems allow customers to complete their tasks without
the assistance of a CSR.

In order to maintain a high level of customer
20   satisfaction, an IVR system must be designed so that
customers can easily navigate the various menus and
accomplish their tasks without spending too much time on
the telephone and becoming frustrated and unsatisfied
with the company and its customer service. Therefore,
25   companies must design and continually test, update, and
improve the IVR systems including the IVR menus so that
the IVR systems function efficiently so that customers
remain satisfied with the level of customer service.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the present embodiments and advantages thereof may be acquired by referring to the following description taken in

5   conjunction with the accompanying drawings, in which like reference numbers indicate like features, and wherein:

FIGURE 1 illustrates a block diagram showing a system incorporating teachings of the present invention;

FIGURE 2 depicts a flow diagram of a method for

10 automating the creation of a customer-centric interface;

FIGURE 3 depicts an example task frequency table;

FIGURE 4 illustrates a block flow diagram of various components of the system for the automated creation of a customer-centric interface;

15 FIGURE 5 illustrates a flow diagram of a method for creating customer-centric menu prompts;

FIGURE 6 illustrates an example graphical user interface for the categorization of statements within a customer-centric interface;

20 FIGURE 7 depicts a flow diagram of a method for the automated categorization of statements within a customer-centric interface;

FIGURE 8 illustrates an example graphical user interface for the analysis of performance data within a

25 customer-centric interface;

FIGURE 9 depicts an example log file including performance data;

FIGURE 10 illustrates a flow diagram of a method for the automated analysis of performance data within a

30 customer-centric interface; and

FIGURES 11 – 13 illustrate flow diagrams depicting a
method for conducting a dialog exchange between an
interactive voice response system and a user.

5   DETAILED DESCRIPTION OF THE INVENTION
Preferred embodiments and their advantages are best
understood with reference to the figures, wherein like
numbers may be used to indicate like and corresponding
parts.

10   Many companies that have customer service programs
and/or call centers, such as telephone companies,
Internet service providers, and credit card companies,
typically have automated systems such as interactive
voice response (IVR) systems that answer and direct

15   customer phone calls when a customer calls seeking
assistance for a particular task such as to change an
address or inquire about payment of a bill. If a
customer does not reach an IVR system when calling a
service number, the customer may speak with a customer

20   service representative (CSR) who either helps the
customer or transfers the customer to an IVR. Within the
IVR, the customer listens to one or more prerecorded
menus or prompts and provides responses using touch-tone
input and/or speech input in order to accomplish their

25   task. Therefore, the content and structure of the IVR
including the prerecorded menus or prompts needs to allow
for customers to easily and quickly accomplish their
tasks with little frustration.
The typical approach to IVR system interface design

30   involves a company design team creating a set of
requirements where the design team is comprised of
various individuals representing different departments

within the company. The design team incorporates various
perspectives and documents from the team members in
designing the IVR interface. The design team decides how
best to structure the IVR interface based on their
5   understanding of the underlying system and/or the
organization of the company. The customers' preferences
and level of knowledge are generally not taken into
account.

Once designed, the IVR interface is tested to ensure
10   functionality and that it is error free. The inclusion
of customers into the design process occurs late in the
development phase, if it all, through usability testing.
But much of the customer input gathered in the usability
testing will not be implemented into the IVR interface
15   because of the costs involved with making changes late in
the development phase. Only significant errors
discovered through the usability testing are generally
corrected. The result is an IVR interface having a
business-centric organization and structure, where the
20   menu options and prompts are structured according to the
organization of the company and are worded using company
terminology.

When calling a customer service number, customers
know why they are calling (to accomplish a specific task)
25   but typically do not know which department within a
company handles specific tasks. Therefore, business-
centric interfaces generally do not allow for customers
to easily and quickly navigate and accomplish their tasks
with little frustration, since business-centric
30   interfaces are designed around a company's organization
and way of thinking. When customers cannot quickly and
easily accomplish their tasks, they generally make

incorrect selections within the IVR interface, resulting
in misdirected calls. Misdirected calls are expensive to
companies both in the time and money spent dealing with a
misdirected call and in lower levels of customer
5   satisfaction resulting from unpleasant customer
experiences with business-centric interfaces, which can
lead to negative feelings towards the company.

In most IVR system implementations, a single persona
may be assigned to the IVR system. However, according to
10   behavioral research, users of automated systems tend to
view automated systems more favorably when the persona or
personality of the system matches the user's personality.
For example, a recent study suggests that introverts and
extroverts tend to be more satisfied with, likely to
15   trust and likely to make a purchase from an automated
system possessing voice characteristics similar to their
own. Similarly, evidence exists showing that many IVR
system users prefer an IVR system having a system voice
matching their own gender.

20   In order for IVR systems to meet customers' needs
and be more customer-centric, the usability of IVR
systems are tested and improved by conducting laboratory
studies or tests where test participants are asked to
accomplish sets of tasks using the IVR system. An
25   example of a task to accomplish may be, "Call Telephone
Company at 555-1111 and change your billing address." In
these studies or tests, the participants use telephones
to interact with an IVR simulation application which is
presented by a laboratory computer. The simulated IVR
30   application plays prerecorded announcements or prompts to
the participants in the form of a series of menus and
records information regarding the participants' responses

such as the menu name, the amount of time the prerecorded
prompt played before the participant made a selection or
pressed a key, and the key that the participant pressed.
Once the study is completed, the recorded information
5   regarding the participants' responses or the performance
data is compiled into a log file with information
regarding each task test stored as an individual
performance data set.

     To analyze the performance data collected by the IVR
10   simulation application in the log file, the company may
score participants call routing performance based on two
factors – accomplishment of the task and the time spent
in the IVR simulation application attempting to
accomplish the task. Analysis of the log file and the
15   performance data is typically done as a manual process
where one or more persons manually examine each
performance data set noting the task, determining if the
participant accomplished the task, and calculating the
time spent listening to the menus or prompts and then
20   manually creating an output file containing the findings
of the IVR simulation. Given that a typical IVR study
generally includes many participants each performing
several different tasks, the manual analysis of the
performance data is a very time consuming, labor
25   intensive, and resource intensive process. In addition,
the manual analysis of the performance data is also
subject to human error such as math errors in calculating
time spent in the menus and in omitting particular data
points.

30   Furthermore, many companies often track statements
made by customers when the customers contact the company
with problems or questions about a product or service or

to alter a product or service. When a customer calls a
service number and speaks to a CSR, the customer
typically tells the CSR the purpose of the call in the
first substantive statement the customer makes.

5   Alternatively, a customer may contact a company via the
company web site or email and generally the first
substantive statement made in the email or web site
response includes the customer's purpose for contacting
the company. These initial statements containing the

10 purpose of the customer's call are often referred to as
opening statements.

     These opening statements can be used by companies to
better design IVR systems, web sites, and any other
customer interfaces between a company and the customers

15 and allow for a more customer-centric interface design.
One effective way to design an IVR system or a web site
interface is to analyze the scripts of incoming calls or
emails to a customer support center or call center to
locate the opening statements and identify the purpose of

20 each call or email by classifying or categorizing each
opening statement. Once categorized, a frequency report
can be created that details how often customers are
calling with specific problems or questions about
specific products or services. For example, a telephone

25 company may want to know how many customers are calling
or emailing about a problem with their bill or to add a
new product to their telephone service. Once a company
knows the frequency of customer complaints and questions,
an IVR system can be designed that incorporates the

30 frequencies so that customers calling with common
problems, complaints, or questions can be serviced
quickly and efficiently. For example, a company would be

able to determine that of the 5,000 service calls
received in one month, what percentage of the calls were
about particular topics and also rank the reasons why the
customers called or emailed the customer support.

5   In order to maximize the utilization of the
statements given by the customers in a customer-centric
interface design, a company therefore needs to track and
categorize the statements. Typically, companies have
manually tracked and manually categorized opening

10   statements. The company manually tracks each call and
manually records and transcribes each opening statement
spoken to a CSR or received via email and then creates a
list of opening statements. An employee of the company
reads the long list of opening statements with a list of

15   categories in front of him/her and assigns a category
label to each opening statement. This is a very time
consuming and costly process because one or more people
manually examining every opening statement and deciding
how to categorize the statement in accordance with

20   multiple category labels requires a large amount of
employee time which is expensive and would be better
utilized in a revenue generating task.

        In addition to the cost and man-power required for
the manual categorization of opening statements, there is

25   also a subjective element to the manual categorization of
opening statements which affects the reliability of the
categorization results. The category labels used to
manually categorize the opening statements are generally
designed to be objective but when applied by a person,

30   the person's subjective thinking and opinions affect how
they categorize the opening statements. For instance, an
opening statement such as "I am calling about my bill for

the charges for Call Waiting" may be categorized by one
person as a billing inquiry and another person as a call
waiting inquiry. Therefore, even though multiple people
may use the same category labels to categorize the
5   opening statements, they might categorize the same
opening statement differently because the categorization
is partly a matter of opinion. This human opinion factor
and subjectiveness creates an inconsistency in the
categorization data and frequency reports that results in
10   unreliable data and a customer interface design that is
not optimized with respect to the opening statements and
the way customers think.

       By contrast, the example embodiment described herein
allows for the automated creation of a customer-centric
15   interface. The customer-centric interface is designed to
best represent the customers' preferences and levels of
knowledge and understanding. Additionally, the example
embodiment allows for the inclusion of the customers in
the design process from the beginning to ensure that the
20   customer-centric interface is both usable and useful for
the customers. The customer-centric interface allows for
the customers to quickly and easily navigate the various
menus within the customer-centric interface to accomplish
their tasks with high levels of customer satisfaction.
25   The customer-centric design also allows for increased
call routing accuracy and a reduction in the number of
misdirected calls. Therefore, companies save time and
money because less time is spent dealing with misdirected
calls and less resources are used by the customers since
30   the customers spend less time within the customer-centric
interface accomplishing their tasks.

       Furthermore, the example embodiment described herein
   allows for the automated categorization of statements to
   better enable the creation of a customer-centric
   interface. Additionally, the example embodiment allows
5 for the creation of objective rules to categorize the
   statements which results in reliable and consistent
   categorization data. Time and money is saved because
   employees are no longer manually looking through lists of
   statements trying to categorize the statements using only
10 category labels. Therefore, employees' time may be
   better utilized in revenue generating projects.
   Furthermore, the objective rules for categorizing the
   statements eliminate the subjective aspect of the
   categorization scheme allowing for the same statement to
15 be categorized with the same category label as long as
   the same set of rules are used to categorize the
   statements. This results in consistent and reliable
   categorization and frequency data which can be used in
   the design and creation of customer interfaces that
20 reflect the customers' view of how the interface should
   operate.
       Furthermore, the example embodiment described herein
   allows for the automated analysis of performance data to
   better enable the creation of a customer-centric
25 interface. Additionally, the example embodiment allows
   for the consistent analysis of performance data free of
   human error. Time and money is saved because employees
   no longer manually examine the performance data
   determining if the task was accomplished and manually
30 calculating the time required to accomplish each task.
   Therefore, employees' time may be better utilized in
   other revenue generating projects since less time is

required to analyze the performance data. Furthermore,
the analysis of the performance data is more reliable
because the analysis is not subject to human error such
as calculation errors and different people are not
5   interpreting the performance data in different manners.

        FIGURE 1 generally illustrates one embodiment of a
customer-centric interface solution incorporating
teachings of the present invention and operable to
provide automated or computer based customer service to
10   callers using an interactive voice response (IVR) system.

        As depicted in FIGURE 1, system 10 preferably
includes at least one IVR system 12. In one embodiment,
IVR system 12 may include one or more traffic handling
devices 14. Traffic handling devices may include, but
15   are not limited to, such devices as routers, switches,
hubs, bridges, content accelerators, or other similar
devices. As depicted, one or more traffic handling
devices 14 may be coupled between communications link 16
and computer system 18. Computing system 18 may be a
20   personal computer, a server, or any other appropriate
computing device. Communications technologies which may
be used as communications link 16 include, but are not
limited to, a PSTN (public switched telephone network),
the Internet using voice over IP (Internet Protocol),
25   such mobile technologies as satellite and PCS (personal
communication service), as well as others.

        In an embodiment of IVR system 12 having a component
or storage system 20 which is maintained separately from
computer system 18, as depicted in FIGURE 1, one or more
30   traffic handling devices 14 may be included and coupled
between computer system 18 and such a storage system 20.
As described below, storage system 20 or portions thereof

may be incorporated into computer system 18, according to
teachings of the present invention.

    Computer system 18 may be constructed according to a
variety of configurations. Preferably, however, computer
5   system 18 includes one or more processors or
microprocessors 22. Processors or microprocessors 22 may
include such computer processing devices as those
manufactured by Intel, Advanced Micro Devices, Motorola,
Transmeta, as well as others. Operably coupled to
10   microprocessor(s) 22 are one or more memory devices 24.
Memory devices 24 may include, but are not limited to,
such memory devices as SDRAM (synchronous dynamic random
access memory), RDRAM (Rambus dynamic random access
memory), FLASH memory, or other memory device operable to
15   functioning with the microprocessor(s) 22 of choice.

    Also operably coupled to microprocessor(s) 22 are
one or more communications interfaces 26. Communications
interface 26 may employ wire-line and/or wireless
technologies. For example, wire-line based
20   communications interfaces 26 may include, but are not
limited to, such wire-line technologies as PSTN (public
switched telephone networks), Ethernet, Token-Ring,
coaxial, fiber optic, as well as others. Examples of
wireless technology based communications interfaces 26
25   may include, but are not limited to, such wireless
technologies as Bluetooth and IEEE (Institute of
Electrical and Electronic Engineers) 802.11b, as well as
others.

    One or more component systems interfaces 28 are also
30   preferably included and coupled to microprocessor 22.
According to teachings of the present invention,
component systems interfaces 28 preferably couple one or

more component systems to microprocessor(s) 22 such that
microprocessor(s) 22 may access the functionality
included therein. Examples of component systems include
storage system 20, video displays, storage devices,
5   scanners, CD-ROM (compact-disc-read only memory) systems,
input/output devices, etc. Component systems interfaces
28 may include, for example, ISA (industry standard
architecture) connections, PCI (peripheral component
interconnect) connections, PCI-X (peripheral component
10   interconnect-extended) connections, SCSI (small computer
systems interface) connections, USB (universal serial
bus) connections, FC-AL (fibre-channel arbitrated loop)
connections, serial connections, parallel connections,
Ethernet connections, IEEE 802.11b
15   receivers/transmitters, Bluetooth receivers/transmitters,
as well as others. In addition, component systems
interfaces 28 may be provided to couple one or more
components system internal to computer system 18, such as
hard disc drive (HDD) devices, CD-ROM read/write devices,
20   etc., to microprocessor(s) 22.

     Computing system 18 further includes hard disk drive
(HDD) 30 containing databases 32, 33, 34, 36, 38, and 40
and processor 22, memory 24, communications interface 26,
component systems interface 28, and HDD 30 communicate
25   and may work together via bus 42 to provide the desired
functionality. The various hardware and software
components may also be referred to as processing
resources. Computer system 18 further includes display
44 for presenting graphical user interface (GUI) 46 and
30   input and output devices such as a mouse and a keyboard.
Computer system 18 also includes rule engine 48, task
engine 50, collection engine 52, customer language engine

54, performance engine 56, and customer structure engine
58, which reside in memory such as HDD 30 and are
executable by processor 22 through bus 42. In other
embodiments, HDD 30 may include more or less than six
5 databases and be remotely located in storage system 20.

        Display 44 presents GUI 46 which allows for a user
or an operator to interact with IVR system 12 and
computer system 18. Shown in FIGURES 6 and 8 are various
example GUIs 46. GUI 46 includes a plurality of screens
10 and buttons that allow the users and the operators to
access and control the operation of IVR system 12 and
computer system 18.

        As illustrated in FIGURE 1 and mentioned above, one
or more traffic handling devices 14 may be coupled
15 between computer system 18 and storage system 20. In
another embodiment, however, storage system 20 may be
included within or internal to computer system 18. In
such an embodiment, storage system 20 or one or more
components thereof may be directly coupled to the one or
20 more component systems interfaces 28.

        Component or storage system 20 may include a variety
of computing devices and is preferably not limited to one
or more types of storage device. In the embodiment of
storage system 20 illustrated in FIGURE 1, a plurality of
25 storage devices, preferably storing one or more
applications and databases for use in accordance with
teachings of the present invention, ·may be provided.
Specifically, component or storage system 20 may include
one or more supplemental hard disc drive (HDD) devices
30 60, digital linear tape (DLT) libraries (not expressly
shown), CD-ROM libraries and/or one or more storage area
networks (SAN) 62. In yet another embodiment of IVR

system 12, one or more HDD devices 60 may be included in
computer system 18 with one or more SANs 62 included in
storage system 20.

    As with many computer systems, a variety of

5   applications 64 may be used to leverage the functionality
or processing capability of computer system 18. In the
present invention, a plurality of applications 64 may be
effectively included in storage system 20, on one or more
HDD devices 60 and/or on one or more SANs 62. For

10 example, one or more communications applications operable
to establish a communication connection with one or more
users via communication link 16 may be included in
storage system 20. In addition, one or more speech
recognition or voice analysis applications are included

15 on HDD devices 60 and/or SAN 62 for use as described
below. A variety of additional applications 64 may also
be included on one or more of HDD devices 60 and/or SANs
62.

    As will be described in more detail below with

20 respect to one embodiment of a method according to the
present invention, one or more persona libraries 66 are
preferably included on storage system 20. Persona
libraries 66 preferably include a plurality of IVR system
personas, one or more of which may be selected for use

25 during a transaction with a given user. In one
embodiment, the personas stored in persona libraries 66
may be pre-existing, i.e., a complete persona or one
having a defined gender, rate of speech, system prompt
menu, etc., needing only to be selected and activated for

30 use in the IVR system. Each persona in the library may
also include a number of styles or strategies. For
example, within a persona designed to communicate like a

calm, caring, mature female (i.e., a motherly persona),
the library may include a first subset of prompts or
scripted dialog designed to help novice callers, a second
subset designed to help expert callers, a third subset
5   designed to sound sympathetic and soothing and a fourth
subset designed to be more abrupt. These different
subsets or styles may be produced by altering
characteristics of the persona such as speaking rate,
choice of formal or informal words, use of terse or
10 verbose utterances, etc. As described below, IVR system
12 may dynamically change from one style to another in
response to detected changes in the speech
characteristics of a caller.

      In another embodiment, persona libraries 66 may
15 contain a plurality of IVR system persona components,
such as gender, rate of speech, tone, inflection, prompt
menus, etc. An overall IVR system persona may be
selected and compiled from selected components to create
an IVR system persona which has been determined,
20 according to teachings of the present invention, to be
the persona most likely to elicit favorable responses
from the user as well as to achieve other benefits.

      Also as described below with respect to one
embodiment of a method of the present invention, one or
25 more user persona profiles 68 may be stored on HDD 30,
HDD devices 60, and/or on SANs 62. According to
teachings of the present invention, when a repeat user
contacts IVR system 12, the IVR system 12 may be
implemented such that the user can be identified, e.g.,
30 from one or more call characteristics, and the user's
preferred or most recent IVR system persona may be
initiated by the IVR system 12. As will be described in

more detail below, one or more responses from the user to
prompts from the user's stored persona 68 may initiate a
change in the persona used to complete the user's desired
transaction.   In other embodiments, the above may be
5   stored in HDD 30 instead of storage system 20.

        FIGURE 2 depicts a flow diagram of a method for
automating the creation of a customer-centric interface.
The method begins at step 70 and at step 72 collection
engine 52 collects a plurality of customer opening
10   statements.   When a customer calls a service number and
speaks to a CSR, the customer typically tells the CSR the
purpose of the call in the first substantive statement
the customer makes.   Alternatively, a customer may
contact a company via the company web site or email and
15   generally the first substantive statement made in the
email or web site response includes the customer's
purpose for contacting the company.   These initial
statements containing the purpose of the customer's call
are often referred to as customer opening statements.
20   Collection engine 52 collects the customer opening
statements from customer service centers and stores the
customer opening statement in customer opening statement
database 32.

        The customer opening statements provide insight into
25   the tasks that the customers inquire about as well as the
language or terminology the customers use to describe the
tasks.   At step 74, customer language engine 54 analyzes
the customer opening statements to determine the language
or terminology used by the customers when referring to
30   particular tasks.   When customers call a service number,
they are not concerned with how the company is going to
accomplish the task just that the task gets accomplished.

Therefore, customer language engine 54 must learn and use
the terminology of the customers in creating customer-
centric menu prompts so that customers will be able to
easily understand and identify how to accomplish their
5   tasks when using the customer-centric interface.

At step 76, customer task model 128 within
collection engine 52 determines the different reasons why
the customers contact the company in order to create a
list of tasks for which the customers access the
10   customer-centric interface. Analysis of the customer
opening statements allows for the determined tasks to be
tested to see if the list of tasks accounts for a
majority of the reasons why the customer contact the
company. The tasks may include such tasks as "telephone
15   line is not working," "question about my bill," "order a
new service," or any other appropriate reason for a
customer to call seeking assistance regarding a product
or service.

Once the list of tasks has been created and
20   determined to cover the majority of the customers'
reasons for calling, task engine 50 determines a task
frequency of occurrence for each task at step 78. The
task frequency of occurrence allows system 10 to
recognize which tasks customers are calling about the
25   most and which tasks the customers are calling about the
least. Task engine 50 determines the task frequency of
occurrence by examining and categorizing the customer
opening statements. Each customer opening statement is
examined to identify the purpose of the call and is then
30   categorized as a particular task.

Once the customer opening statements have been
categorized, task engine 50 creates a task frequency

table that ranks the tasks according to the task
frequency of occurrence. The task frequency table
details how often customers call with specific problems
or questions about each particular task. An example task
5   frequency table 120 for eighteen tasks 127 - 161 is shown
in FIGURE 3 and includes column 122 for the frequency
rank of the task, column 124 for the task, and column 126
for the frequency value. In other embodiments, task
frequency table 120 may include more or less than
10   eighteen tasks. Task frequency table 120 shows that
eighteen tasks account for more than 80% of the customer
opening statements or service calls received from the
customers. Task frequency table 120 allows for system 10
to determine which tasks the customers call about the
15   most and provides valuable information on how to arrange
the customer-centric menu prompts within the customer-
centric interface.

        Task frequency table 120 is ordered in descending
frequency order and is a statistically valid
20   representation of the tasks that the customers inquire
about when calling customer service centers. Because
having a menu prompt for every single task results in
numerous menu prompts making customer navigation of the
customer-centric interface burdensome and slow, at step
25   80 task engine 50 determines which tasks are to be
included in the customer-centric interface. In order to
allow easy and quick navigation for the customers but at
the same time not utilize too many company resources
operating the customer-centric interface, only the most
30   frequently occurring tasks are included within the
customer-centric interface.

Task engine 50 utilizes task frequency table 120 to
determine which tasks are to be included in the customer-
centric interface. In one embodiment, task engine 50
includes only the tasks that have a frequency of

5   occurrence of 1% or higher. Task frequency table 120
includes only the tasks having a frequency of occurrence
of 1% or higher and includes eighteen tasks accounting
for 80.20% of the tasks represented in the customer
opening statement. In another embodiment, task engine 50

10 includes tasks so that the total number of included tasks
accounts for a specified percentage coverage of the tasks
represented in the customer opening statements. For
instance, task engine 50 may include a specified number
of tasks so that the total frequency of occurrence is a

15 specific total percentage coverage value such as 85%, 90%
or any other appropriate percentage of coverage. Either
embodiment typically allows for between fifteen and
twenty tasks to be included in the customer-centric
interface.

20   For efficient operation, the customer-centric
interface does not include an opening customer-centric
menu prompt listing all of the included tasks in
frequency order. Such an opening menu prompt would take
too long for the customers to listen to and would not

25 allow for quick and easy navigation of the customer-
centric interface. Therefore, the customer-centric
interface is of a hierarchical design with the tasks
grouped together by task relationships.

In order for the customer-centric interface to be

30 organized from the vantage of the customers, the included
tasks need to be grouped according to how the customers
perceive the tasks to be related. Therefore at step 82,

customer structure engine 58 elicits from one or more
test customers each customer's perceptions as to how the
included tasks relate to each other in order to create
interface structure for the customer-centric interface.

5   Interface structure is how the tasks are placed within
the customer-centric interface and organized and grouped
within the customer-centric menu prompts. For instance,
the interface structure of a web page refers to how the
pages, objects, menu items, and information is organized

10   relative to each other while the interface structure for
an IVR system refers to the sequence and grouping of the
tasks within the customer-centric menu prompts. The
interface structure for the customer-centric interface
needs to allow for the customers to find information and

15   complete tasks as quickly as possible without confusion.
        Customer structure engine 58 uses tasks 127 - 161
from task frequency table 120 and performs customer
exercises with the customers to elicit customer feedback
regarding how the customers relate and group together

20   tasks 127 - 161. For instance, customer structure engine
58 may require a group of test customers to group tasks
127 - 161 into one or more groups of related tasks. In
addition, customer structure engine 58 may also require
the test customers to make comparative judgments

25   regarding the similarity of two or more of the tasks
where the test customers state how related or unrelated
they believe the tasks to be. Furthermore, customer
structure engine 58 may require the test customers to
rate the relatedness of the tasks on a scale. Customer

30   structure engine 58 performs the customer exercises using
a test IVR system, a web site, or any other appropriate
testing means. In addition to eliciting tasks

relationships, customer structure engine 58 also elicits
from the test customers general names or headings that
can be used to describe the groups of tasks in the
customers own language or terminology.

5   Once customer structure engine 58 elicits from the
test customers how the customers perceive tasks 127 –161
to relate to each other, customer structure engine 58
aggregates the customer feedback and analyzes the
customer feedback to determine customer perceived task
10   relationships. The customer perceived task relationships
are how the customers perceive the tasks to be related.
Customer structure engine 58 represents the customer
perceived task relationships in a numerical data matrix
of relatedness scores that represents collectively the
15   customers' perceived relatedness of the included tasks.
       At step 84, customer structure engine 58 utilizes
the customer perceived task relationships and the
numerical data matrix and combines the included tasks
into one or more groups of related tasks. For example,
20   using the customer feedback from the customer exercises,
customer structure engine 58 determines that the
customers perceive tasks 133, 155, and 159 as related and
group one, tasks 147, 149, and 157 as related and group
two, tasks 127, 129, 131, 135, 139, 141, 143, 145, 153,
25   and 161 as related and group three, and tasks 137 and 151
as related and group four. To aid in the grouping of the
tasks and to better enable the company to understand the
structure and grouping of the tasks, customer structure
engine 58 represents the customer perceived task
30   relationships and numerical data matrix in a graphical
form. For instance, customer structure engine 58 may

generate a flow chart or indogram illustrating a
customer-centric call flow for the groups of tasks.

At step 86, task engine 50 orders the groups of task
and the tasks within each group based on the task
5   frequency of occurrence. Task engine 50 determines a
frequency of occurrence for each group of tasks by
summing the individual frequency of occurrences for each
task within each group. From the example above, group
one has a group frequency of occurrence of 8.9% (6.7% +
10   1.1% + 1.1%), group two has a group frequency of
occurrence of 6.2% (3% + 2.1% + 1.1%), group three has a
group frequency of occurrence of 59.4% (14% + 11.6% +
11.3% + 5.6% + 3.8% + 3.8% + 3.5% + 3.4% + 1.4% + 1.0%),
and group four has group frequency of occurrence of 5.7%
15   (3.8% + 1.9%). Task engine 50 orders the groups within
customer-centric interface in descending frequency order
so that the tasks having the highest frequency of
occurrence are heard first by the customers when the
customers listen to the customer-centric menu prompts
20   within the customer-centric interface. Since 59.4% of
the customer will be calling about a task in group three,
task engine 50 orders group three first followed by group
one, group two, and group four.

In addition to ordering the groups of tasks, task
25   engine 50 also orders the tasks within each group. Task
engine 50 orders the tasks within each group according to
each task's frequency of occurrence from the highest
frequency of occurrence to the lowest frequency of
occurrence. For instance, the tasks in group one are
30   ordered as task 133, task 155, and task 159. The tasks
in group two are ordered as task 147, task 149, and task
157. The tasks in group three are ordered as task 127,

task 129, task 131, task 135, task 139, task 141, task
143, task 145, task 153, and task 161. The tasks in
group four are ordered as task 137 and task 151. The
grouping and ordering of the tasks allow for the high
5   frequency tasks to be more accessible to the customers
than the low frequency tasks by placing the tasks having
higher frequency of occurrences higher or earlier in the
customer-centric interface menu prompts.
     At step 88, customer language engine 54, task engine
10   50, and customer structure engine 58 work together to
create and order the customer-centric menu prompts for
the customer-centric interface. Task engine 50 and
customer structure engine 58 do not take into account
customer terminology when calculating task frequencies,
15   grouping the tasks, and ordering the tasks. So once task
engine 50 and customer structure engine 58 create
interface structure including ordering the included
tasks, customer language engine 54 creates customer-
centric menu prompts using the customers own terminology.
20   Customer-centric menu prompts in the language of the
customers allow for the customers to more easily
recognize what each menu prompt is asking and allows the
customer to accomplish their tasks quickly and with
little frustration. In other embodiments, customer
25   language engine 54 may create customer-centric menu
prompts using action specific object words in addition to
the customers own terminology. The use of action
specific object words to create menu prompts is described
in further detail below with respect to FIGURE 5.
30   Once system 10 creates the customer-centric menu
prompts and the customer-centric interface, performance
engine 56 tests the customer-centric interface at step 90

by performing usability tests. Performance engine 56
performs the usability tests in order to locate and fix
any problems with the customer-centric interface before
the customer-centric interface is implemented for use by
5   all customers. The usability tests involve laboratory
tests where test customers are asked to accomplish sets
of tasks using the customer-centric interface such as
"Call Telephone Company at 555-1111 and change your
billing address." In these tests, the test customers use
10   telephones to interact with the customer-centric
interface. The customer-centric interface plays the
prerecorded customer-centric menu prompts to the test
customers and performance engine 56 records information
regarding the test customers' responses such as the menu
15   name for the menus accessed, the amount of time the
prerecorded menu prompt played before the test customer
made a selection or pressed a key, and the key that the
test customer pressed.

When the usability tests conclude, at step 92
20   performance engine 56 analyzes the results of the
usability tests. With respect to the results,
performance engine 56 focuses on three different
usability test results: customer satisfaction, task
accomplishment, and response times. Customer
25   satisfaction is whether or not the test customer was
satisfied using the customer-centric interface.
Performance engine 56 gathers customer satisfaction by
asking the test customers a·variety of questions
regarding their experiences in interacting with the
30   customer-centric interface such as how satisfied the test
customer was in accomplishing the assigned tasks, how
confident the test customer was about being correctly

routed, the level of agreement between the selected menu
prompts and test customers' assigned tasks, and whether
the test customers would want to use the customer-centric
interface again.

5   Performance engine 56 also determines a task
accomplishment or call routing accuracy score. Task
accomplishment measures whether a test customer
successfully completes an assigned task and is based on a
sequence of key presses necessary to navigate the
10   customer-centric interface and accomplish the task.
Performance engine 56 determines if the test customers
actually accomplished their assigned task. For example,
if a test customer was assigned the task of using the
customer-centric interface to inquire about their bill,
15   did the test customer correctly navigate the customer-
centric menu prompts in order to inquire about their
bill.   Performance engine 56 examines all the different
menu prompts accessed by the test customers and compares
the test customer key sequences with the correct key
20   sequences in order to determine if the test customers
accomplished the assigned tasks.

     In addition to customer satisfaction and task
accomplishment, performance engine 56 also calculates a
response time or cumulative response time (CRT) for each
25   customer-centric menu prompt accessed by the test
customers. The response time indicates the amount of
time a test customer spends interacting with each
customer-centric menu prompt and the customer-centric
interface. The response times reflects the amount of
30   time the test customers listen to a menu prompt versus
the amount of time it takes for the menu prompt to play
in its entirety. The amount of time the test customers

spend listening to the menu prompt is not a very valuable
number unless menu duration times are also taken into
account. A menu duration time is the amount of time it
takes for a menu prompt to play in its entirety. For
5   instance, a menu prompt may have five different options
to choose from and the menu duration time is the amount
of time it takes for the menu prompt to play through all
five options.

Performance engine 56 records a listening time for
10 each test customer for each menu prompt. The listening
time is the time the test customers actually spend
listening to a menu prompt before making a selection.
Performance engine 56 also has access to the menu
duration times for all of the customer-centric menu
15 prompts in the customer-centric interface. Performance
engine 56 calculates a response for a menu prompt which
is the difference between the listening time and the menu
duration time by subtracting the menu duration time from
the listening time.

20   For example, if the introductory menu prompt of the
customer-centric interface requires 20 seconds to play in
its entirety (menu duration time) and the test customer
listens to the whole menu and then makes a selection, the
test customer has a listening time of 20 seconds and
25 receives a CRT score or response time of 0 (20 - 20 = 0).
If the test customer only listens to part of the menu
prompt, hears his choice and chooses an option before the
whole menu plays, then the test customer receives a
negative CRT score or response time. For instance, if
30 the test customer chooses option three 15 seconds
(listening time) into the four-option, 20 second menu
prompt, the test customer receives a CRT score or

response time of "-5" (15 - 20 = -5). Conversely, the
test customer has a response time of +15 if the test
customer repeats the menu prompt after hearing it once,
and then choose option three 15 seconds (35 second
5   listening time) into the second playing of the menu (35 -
20 = 15).

A negative response time is good because the test
customers spent less time in the customer-centric
interface than they could have and a positive response
10 time is bad because the test customers spent more time
than they should have in the customer-centric interface.
In addition to calculating response times for individual
menu prompts, performance engine 56 may also calculate
response times for entire tasks for each test customer by
15 summing the menu duration times and the listening times
for each menu prompt required to accomplish the task and
subtracting the total menu duration time from the total
listening time.

Once performance engine 56 has determined customer
20 satisfaction, task accomplishment, and response times,
performance engine 56 generates a performance matrix
which charts customer satisfaction, task accomplishment,
and response times for each test customer, each customer-
centric menu prompt, and each task. The performance
25 matrix allows for performance engine 56 to determine if
any of the customer-centric menu prompts or tasks have
unsatisfactory performance at step 94 by examining the
combination of customer satisfaction, task
accomplishment, and response times and thereby evaluating
30 how well the customer-centric interface performs.
Ideally a customer-centric menu prompt and task have a
high level of customer satisfaction, a negative or zero

response time, and a high rate of task accomplishment.
For unsatisfactory performance, performance engine 56
looks for low customer satisfaction, low task completion,
or a high positive response time. By charting the
5   customer satisfaction, task accomplishment, and response
times on the performance matrix, performance engine 56
can determine when one of the test results is not
satisfactory.

If a customer-centric menu prompt or task has
10   unsatisfactory performance at step 94, then at step 96
performance engine 56 selects the menu prompt or task, at
step 98 determines the reason for the unsatisfactory
performance, and at step 100 modifies the customer-
centric menu prompt or task to correct for the
15   unsatisfactory performance. For example, a task may have
a high level of customer satisfaction and high rate of
task accomplishment but a positive response time. The
test customers are accomplishing the task and are
satisfied when interacting with the customer-centric
20   interface but are spending too much time interacting with
the customer-centric interface as indicated by the
positive response time. The positive response time is
not good for the customer-centric interface because the
customers are using unnecessary resources from the
25   customer-centric interface in the form of too much time
in accomplishing the task. By examining the menu prompts
for the task, performance engine 56 determines that the
terminology used in the menu prompts for the task is not
the terminology used by the customers. Therefore,
30   performance engine 56 alerts customer language engine 54
to the terminology problem and customer language engine

54   rewards the menu prompts for the task using the
customers own terminology.

     Once performance engine 56 locates and corrects the
problem, performance engine 56 determines if there are
5   additional menu prompts or tasks that have unsatisfactory
performance at step 102. If at step 102 there are
additional menu prompts or tasks having unsatisfactory
performance, then at step 104 performance engine 56
selects the next menu prompt or task having
10   unsatisfactory performance and returns to step 98.
Performance engine 56 repeats steps 98, 100, 102, and 104
until there are no additional menu prompts or tasks at
step 102 having unsatisfactory performance. When there
are no additional menu prompts or tasks having
15   unsatisfactory performance at step 102, the process
returns to step 90 and performance engine 56 tests the
customer-centric interface having the modified menu
prompts or tasks. Performance engine 56 repeats steps
90, 92, 94, 96, 98, 100, 102, and 104 until there are no
20   customer-centric menu prompts or tasks having
unsatisfactory performance at step 94.

     When there are no customer-centric menu prompts or
tasks having unsatisfactory performance at step 94, at
step 106 system 10 implements the customer-centric
25   interface for use by the customers. As customers use the
customer-centric interface, system 10 and performance
engine 56 continually monitor the performance of the
customer-centric interface checking for low customer
satisfaction levels, low task completion rates, or high
30   positive response times at step 108. When system 10
discovers an unsatisfactory post-implementation result
such as those described above, system 10 determines the

cause of the problem and modifies the customer-centric
interface to correct the problem at step 110. As long as
the customer-centric interface is accessible by the
customers, system 10 monitors the customer-centric
5   interface performance and modifies the customer-centric
interface to allow for customer-centric menu prompts that
are worded in the terminology of the customers, that
directly match the tasks that the customers are trying to
accomplish, and that are ordered and grouped by customer
10   task frequencies and the customers' perceptions of task
relationships.

     FIGURE 4 illustrates a block flow diagram of how
collection engine 52, customer language engine 54, task
engine 50, customer structure engine 58, and performance
15   engine 56 of system 10 interact and interoperate to
automatically create the customer-centric interface. In
addition, FIGURE 4 also represents the various functions
for collection engine 52, customer language engine 54,
task engine 50, customer structure engine 58, and
20   performance engine 56.

     Collection engine 52 gathers customer intention
information from the customer opening statements and
includes customer task model 128 which includes the list
of tasks for which the customers access and use the
25   customer-centric interface. Customer language engine 54,
task engine 50, and customer structure engine 58 perform
their various functions by processing and manipulating
the customer intention information and task list.

     Customer language engine 54 develops customer-
30   centric menu prompts for the customer-centric interface
using the customers own terminology. Customer language
engine 54 analyzes the customers' language by analyzing

and tracking every word used by the customers in the
customer opening statements to get a feel for how the
customers refer to each of the tasks. Customer language
engine 54 counts each word in each customer opening
5   statement to determine which words the customers use the
most and thereby recognize which of the customers' words
are best to use in creating customer-centric menu prompts
using the customers own terminology.

In addition to creating customer-centric menu
10   prompts using the customers own terminology, in other
embodiments of system 10 customer language engine 54 may
also create customer-centric menu prompts using action
specific object words taken from the customer opening
statements.

15   FIGURE 5 illustrates a flow diagram for creating
customer-centric menu prompts utilizing action specific
object words. Customer wordings of tasks in customer
opening statements are generally in four different
styles: action-object ("I need to order CALLNOTES");
20   action ("I need to make changes"); object ("I don't
understand my bill"); and general ("I have some
questions"). Menu prompts are typically worded in one of
four styles: action specific object ("To order CALLNOTES
press one"); specific object (For CALLNOTES press two");
25   general object ("To order a service press three"); and
action general object ("For all other questions press
four").

The style of the menu prompt wording can have an
effect on the performance of the menu prompt due to the
30   customers interaction with the menu prompt. Wording menu
prompts as action specific object is typically the best
way to word customer-centric menu prompts because upon

hearing an action specific object menu prompt, the
customer generally knows that it is the menu prompt they
want to select and therefore response times decrease
because customers do not have to repeat the menu prompts
5   in order to make a selection. For example, if a customer
calls wanting to order CALLNOTES and the second option in
the six option menu prompt is "To order CALLNOTES press
two" then the customer will typically press two without
listening to the rest of the menu prompts and therefore
10 have a negative response time, high customer
satisfaction, and high task accomplishment rate.

In order to create customer-centric menu prompts
using action specific object words, customer language
engine 54 determines the action words and object words
15 used by the customers. At step 132, customer language
engine 54 analyzes the customer opening statements in
customer opening statement database 32 in order to
identify the action words and the object words used by
the customers in their opening statements. In addition
20 to identifying the action words and the object words,
customer language engine 54 also determines which of the
action words are specific action words and which of the
object words are specific object words. For instance,
"order" and "pay" are specific action words and
25 "CALLNOTES" and "Call Waiting" are specific object words
while "service" and "question" are not specific object
words.

At step 134, customer language engine 54 saves the
specific action words in specific action database 34 and
30 the specific object words in specific object database 36.
When saving the specific action words and the specific
object words, customer language engine 54 identifies and

maintains the relationships between the specific action
words and the specific object words by linking the
specific action words with the specific object words that
were used together by the customers as shown by arrows
5   199 in FIGURE 5. For example, for the customer opening
statements of "I want to buy CALLNOTES" and "I want to
inquire about my bill," "buy" and "inquire" are the
specific action words and "CALLNOTES" and "bill" are the
specific object words. When customer language engine 54
10   saves the respective specific action words and specific
object words in databases 34 and 36, a link will be
maintained between "buy" and "CALLNOTES" and between
"inquire" and "bill." Maintaining how the customers use
the action words and object words in databases 34 and 36
15   prevents erroneous combinations of specific action words
and specific object words when creating customer-centric
menu prompts. An example erroneously combined menu
prompt is "To buy a bill press one" since the statement
would not make sense to the customer. The linking of the
20   specific action words with the specific object words
which the customer used together allows for the formation
of correct customer-centric menu prompts that make sense
to the customers.

In addition to storing the specific action words and
25   the specific object words in databases 34 and 36,
customer language engine 54 also calculates a frequency
of occurrence for each specific action word and each
specific object word and stores the specific action words
and the specific object words in databases 34 and 36 in
30   accordance with the frequency of occurrence in descending
frequency order. Therefore, the specific action words
having the highest frequency of occurrence are stored at

the top of specific action database 34 and the specific
object words having the highest frequency of occurrence
are stored at the top of specific object database 36.

    Once customer language engine 54 determines the
5   frequency of occurrence and stores the specific action
words and the specific object words, at step 136 customer
language engine 54 generalizes the specific action words
into general groups of specific action words and
generalizes the specific object words into general groups
10 of specific object words. Customer language engine 54
examines the specific action words and the specific
object words for commonalties and then groups the
specific action words and the specific object words
together in groups based on the commonalties. For
15 example, the specific action words of "buy," "order," and
"purchase" all share the commonality of acquiring
something and may be grouped together. The specific
object words of "CALLNOTES" and "Call Waiting" share the
commonality of being residential telephone services and
20 therefore may be grouped together. Customer language
engine 54 assigns names for each of the general groups of
specific action words and the specific object words and
saves the general action words in general action database
38 and the general object words in general object
25 database 40 at step 138.

    Having specific action database 34, specific object
database 36, general action database 38, and general
object database 40 allows for a great resource for
customer language engine 54 to locate customer
30 terminology when creating customer-centric menu prompts.
For creating upper level hierarchical menu prompts,
customer language engine 54 uses words from general

action database 38 and general object database 40.   To
create action specific object menu prompts in the words
of the customers for lower level hierarchical menu
prompts, customer language engine 54 uses words from
5   specific action database 34 and specific object database
36.   Because the specific action words and the specific
object words are ordered by frequency in databases 34 and
36, customer language engine 54 can create action
specific object menu prompts using the customer
10   terminology most often used by the customers.

       While customer language engine 54 determines the
customer terminology and wording to use for the customer-
centric menu prompts, task engine 50 determines the
frequency of occurrence for the tasks that the customers
15   call about and also determines which tasks will be
included in the customer-centric interface.   Generally
the customer opening statements are from more than one
call center so when determining the frequency of
occurrence for each task, task engine 50 takes into
20   account the volume of calls into each call center when
constructing the task frequency table so that the
frequency results are accurate.   Frequency of occurrence
data must be weighted so that a call center receiving
three million calls does not have the same weight as a
25   call center receiving ten million calls.

       Once task engine 50 determines the tasks to be
included in the customer-centric interface including all
tasks down to 1% frequency or to a percentage coverage,
customer structure engine 58 elicits customer perceived
30   task relationships for the included tasks as described
above.   Utilizing the customer perceived task
relationships, customer structure engine 58 creates

interface structure for the customer-centric interface
and represents the interface structure both as a
numerical data matrix and a graphical representation.

At box 130, customer language engine 54, task engine
5   50, and customer structure engine 58 work together to
automatically create the customer-centric interface.
Customer language engine 54 contributes the wording of
the customer-centric menu prompts in the customers own
terminology for the customer-centric interface. Task
10   engine 50 provides the tasks that are to be included in
the customer-centric interface, the ordering of the
groups of tasks in the menu prompts, and the ordering of
the tasks within the groups of tasks. Customer structure
engine 58 provides the interface structure or grouping of
15   tasks for the customer-centric interface. After the
automated creation of the customer-centric interface,
performance engine 56 performs usability tests on the
customer-centric interface as described above and
evaluates and reconfigures the customer-centric interface
20   based on customer satisfaction, task accomplishment, and
response times during both the testing phase and
implementation.

As described above, when creating a customer-centric
interface, the customers' opening statements need to be
25   categorized in order to determine what tasks the
customers are calling about. Therefore, FIGURE 7 depicts
a flow diagram of a method for the automated
categorization of statements. The method begins at step
180 and at step 182 a user selects the statements to be
30   categorized. Before system 10 can automatically
categorize the statements, the user must have one or more
statements to categorize and load the list of statements

into system 10. The statements may be opening statements
as defined above, written statements from a training
session, survey responses, search statements from a web
site or pop-up window, statements evaluating a customer's
5   experience and satisfaction in a test environment, or any
other appropriate response to an open-ended question that
can be analyzed using content text analysis.

Typically, the statements are recorded, transcribed,
configured in a format that can be understood by system
10 10, and then placed in a text file which may be stored in
database 32. Because there may be more than one list of
statements and therefore more than one text file, the
user chooses what list of statements to categorize by
selecting a text file using open file button 144. Open
15 file button 144 allows the user to view all the available
files containing statements and then select the file
containing the list of statements to be categorized.
Once the list of statements has been selected, system 10
reads the list of statements from database 32.

20   After the selection of the statements to be
categorized, at step 184 the user decides whether to use
rule engine 48 to create new rules to categorize the
statements or use existing rules already stored in
database 33 to categorize the statements. If at step 184
25 the user decides to create new rules, then at step 186
the user accesses rule engine 48 to create new rules.
New rules are desirable when there have been new products
or services recently made available to the customers and
the existing rules do not reflect these new products or
30 services or when the statements are from a new domain not
covered by the existing rules, such as survey responses

where all the existing rules pertain to statements from
customer service call centers.

The user utilizes rule engine 48 and rule creation
screen 160 to create new rules and then edit the newly
5   created rules. Creation of the rules involves the use of
four include boxes 162, 163, 165, and 167 and two exclude
boxes 169 and 171. In other embodiments, there may be
more or less than four include boxes and more or less
than two exclude boxes. The user inputs combinations of
10   words and text strings that should be included in the
statement in order for the statement to satisfy the rule
include boxes 162, 163, 165, and 167 and combinations of
words and text strings that should not be in the
statement in order for the statement to satisfy the rule
15   in exclude boxes 169 and 171. Each rule is also
associated with a particular category label which the
user enters in category label box 164.

For example, a user may want to create a new rule to
categorize statements with respect to the late payment of
20   customer bills. Therefore "late" may be entered in
include box 162, "bill" may be entered in include box
163, "paid" may be entered in exclude box 169, and
"labill" may be entered in category label box 164. This
allows for a rule that finds statements that contain the
25   words "late" and "bill" but do not contain the word
"paid." If a statement contains the words "late" and
"bill" and does not include the word "paid," then the
statement would be categorized with the category label
"labill," meaning the purpose of the statement is to
30   inquire about a late bill that has not yet been paid.

Once a user enters in the desired words or text
strings in include boxes 162, 163, 165, and 167 and

exclude boxes 169 and 171, the user selects apply rule
button 166 and the rule appears in rule screen 170 and is
available to be edited and used to categorize the
statements. The user may then repeat the above process
5   to create as many rules as needed. In addition, other
embodiments allow for rules where a noun in the singular
form in include box 162 includes all forms of the noun
(singular and plural) and a verb in the present tense in
include box 162 includes all tenses and forms of that
10   verb. This allows for a bigger hit rate when applying
the rules to the statements since one rule is satisfied
by a statements containing any form of the noun or verb
and saves time because multiple rules are not required
for each form of the noun or verb.

15   After the creation of the rules, at step 188 the
user groups the rules into sets of rules. There may be
different sets of rules for different applications or
divisions of a company. For example, the marketing
division may have a set of rules to categorize a list of
20   statements while the product development division may
have a different set of rules to categorize the same list
of statements. This is because different users may be
interested in different terms with respect to a list of
statements. In addition, different sets of rules may
25   also be necessary for different kinds of statements or
statements from different domains. A user may use one
set of rules to categorize opening statements from a call
center and a different set of rules to categorize survey
responses from a web survey questionnaire. Therefore,
30   rule engine 48 allows for the rules to be grouped into
different sets of rules with the name for each set of
rules displayed in set box 168 and the sets of rules

saved in database 33. In addition, the user may group
only newly created rules together in a group or group
together newly created rules with existing rules when
creating sets of rules.

5   At step 190, the rules must be arranged in a rule
order in accordance with a rule hierarchy enabling
performance engine 56 to apply the rules in the correct
order thereby preventing inconsistent results. Typically
the rule hierarchy is from specific rules to general

10   rules but can be any other appropriate way of ordering
the rules. For a specific to general rule hierarchy,
performance engine 56 applies the most specific rules
first to a statement and then applies the more general
rules if the statement does not satisfy any of the

15   specific rules.

For example, a user wants to find both "phone" and
"telephone" separately. A rule specifying "telephone"
needs to be above the rule specifying "phone" in the rule
hierarchy so that the "telephone" rule is applied to a

20   statement before the "phone" rule is applied to a
statement. If the "phone" rule is applied before the
"telephone" rule, then when performance engine 56 locates
a statement containing the word "telephone," performance
engine 56 will find "phone" in "telephone" and categorize

25   the statement with the "phone" category label instead of
the "telephone" category label and the statement will be
incorrectly categorized. But if the "telephone" rule is
placed above the "phone" rule in the rule hierarchy, then
performance engine 56 will find "telephone" in the

30   statement, categorize that statement with the "telephone"
category label and move on to the next statement without
applying the "phone" rule. Therefore, the most specific

rules need to be placed at the top of the rule hierarchy
and the most general rules need to be placed at the very
end or bottom of the rule hierarchy with a gradual
gradient from specific to general in-between.

5   Once the rules have been grouped and ordered in a
correct rule hierarchy, rule engine 48 stores the newly
created rules, sets of rules, and rule hierarchy in
database 33 at step 192 so that users and performance
engine 56 may later access the rules. After rule engine
10 48 saves the rules, at step 194 the user selects the rule
or the set of rules that the user wants to have
performance engine 56 apply to the list of statements.

      If at step 184 the user decides to not create any
new rules but instead to use existing rules, then at step
15 196 the user selects and edits rules from the lists of
existing rules stored in database 33. Existing rules
include rules that have already been created and saved by
the process outlined above at steps 186 through 194. If
a user has already created a set of rules that has worked
20 well in the past in categorizing statements, then the
user may want to use these rules instead of creating new
rules. The user selects from the list of rules in set
box 168 and the rules from the selected set of rules
appear in rule screen 170. Once the rules appear in rule
25 screen 170, the user may edit an existing rule such as
rule 173 by selecting it in rule screen 170 and clicking
edit rule button 156. The rule then appears in rule
creation screen 160 and the user may modify include boxes
162, 163, 165, and 167 and exclude boxes 169 and 171.
30 Once the user has a set of rules for performance engine
56 to apply to the list of statements, the process
continues to step 198.

At step 98, the user selects run button 148 and
performance engine 56 applies the selected rules to the
list of statements in order to determine a category label
for each statement. Performance engine 56 cycles through
5   the list of statements one statement at a time applying
the rules to a statement until each statement satisfies a
rule. Performance engine 56 begins applying the rules to
the list of statements at step 200 by applying the first
rule in the rule hierarchy to the first statement in the
10   list of statements. When performance engine 56 applies
the rules to the statements, performance engine 56 strips
the punctuation off the statements so that "bill," and
"bill" do not appear as two different text strings.

At step 202, performance engine 56 determines if the
15   statement satisfies the first rule. Performance engine
56 determines if a statement satisfies a rule by
searching the statement for the presence of particular
text string combinations or words and the exclusion of
other text string combinations or words. For instance,
20   rule 173 is the highest rule in the rule hierarchy shown
in rule screen 170. Therefore, performance engine 56
searches the first statement to see if the text string
"dsl" is present in the first statement. If "dsl" is not
present in the first statement, then the first statement
25   does not satisfy rule 173. If the statement does not
satisfy the rule, then at step 204 performance engine 56
checks to see if there are additional rules in the set of
rules to apply to the statement. If there are additional
rules to apply to the statement, then at step 206
30   performance engine 56 applies the next rule in the rule
hierarchy to the statement and the process returns to
step 202 where performance engine 56 determines if the

statement satisfies this rule. Steps 202, 204, and 206
repeat until either the statement satisfies a rule at
step 202 or until the statement does not satisfy any of
the rules at step 202 and there are no more rules to
5   apply to the statement at step 204.

        If the statement satisfies a rule at step 202, then
at step 208 performance engine 56 assigns the category
label associated with the satisfied rule to the
statement. So if the statement contained the text string
10   "dsl," then performance engine 56 assigns the "dsl"
category label to the statement. But if the statement
does not satisfy any of the rules at step 202 and there
are no more rules left to apply at step 204, then
performance engine 56 applies a catch-all rule to the
15   statement and labels the statement with the catch-all
category label at step 210. The catch-all rule and
category label is designed for statements that do not fit
within any of the other rules. Performance engine 56
labels the statement as catch-all so that the statement
20   may be examined at a later date to determine if the
statement really does not satisfy any of the rules or if
there is a malfunction of system 10 which resulted in the
statement not satisfying any of the rules. A high number
of catch-all category labels may indicate that system 10,
25   rule engine 48, or performance engine 56 are not
operating correctly and require attention.

        After performance engine 56 assigns a category label
to the statement at either step 208 or step 210, at step
212 performance engine 56 checks to see if there are
30   additional statements in the list of statements that
require categorization. If there are additional
statements to be categorized at step 212, then at step

214 performance engine 56 selects the next statement to
be categorized and applies the first rule in the rule
hierarchy to the statement and then determines if the
statement satisfies the rule at step 202. Performance
5   engine 56 repeats steps 202 – 212 until performance
engine 56 determines at step 212 that there are no
additional statements to be categorized.

    For instance, a statement to be categorized is "I
cannot access my email account." Performance engine 56
10 applies the first rule in rule screen 170, rule 173, to
the statement. Performance engine 56 applies rule 173 by
searching the statement "I cannot access my email
account" for the text string "dsl." Performance engine
56 determines that the statement does not contain the
15 text string "dsl" and therefore the statement does not
satisfy rule 173. Performance engine 56 then applies
each rule below rule 173 to the statement one rule at a
time until the statement satisfies a rule. When
performance engine 56 gets to rule 175 and applies rule
20 175 to the statement, performance engine 56 determines
that the statement includes the text string "email" and
does not include the text strings "bill" and "can't
comm." Therefore, the statement satisfies rule 175 and
performance engine 56 assigns category label "email" to
25 the statement.

    When there are no additional statements to be
categorized, performance engine 56 creates an output file
at step 216 and the process ends at step 218. The output
file includes all the statements from the list of
30 statements and each corresponding category label. An
example output file with three statements is shown in
Table 1.

Table 1 – Sample Output File	
Statement	**Category Label**
I cannot access my email account	email
My DSL connection is slow	dsl
I have forgotten my password	password

The output file allows system 10 or a user to determine
the frequency of occurrence for each category label and
5   therefore determine which categories customers are
calling the most about. Knowing which categories the
customers are calling the most about allows for a
customer-centric interface design that takes into account
the customers' way of thinking and is therefore easier to
10 for the customer to use. The interface design that is
easier for the customer to use allows the customer to
accomplish their tasks in less time and a more efficient
manner resulting in less company resources being used in
servicing the customers and therefore lower costs for a
15 company.

     In order to make the customer-centric interface
accessible and easy to use for the customers, the
customer-centric interface needs to be continually tested
and modified using both actual and test data. FIGURE 10
20 depicts a flow diagram of a method for the automated
analysis of performance data. The method begins at step
310 and at step 312 a user or an operator of system 10
selects the performance data to be analyzed. System 10
allows for up to three different log files to be analyzed
25 at one time. In other embodiments, system 10 may analyze
more than three log files at the same time. Each time an
IVR study or test occurs, a log file containing

performance data from that test is created. So if there
are three IVR tests in one day – one in the morning, one
in the afternoon, and one in the evening – then there
will be three log files at the end of the day. System 10
5   and GUI 46 allow for simultaneous analysis of the three
log files at the same time to allow for more efficient
operation of system 10.

     To analyze more than one log file at a time, the
user selects the log file to be analyzed in input windows
10   230, 232, and 234. If only one log file is to be
analyzed, the user selects the log file in input window
230. If more than one log file is to be analyzed, the
first log file is selected in input window 230, the
second log file is selected in input window 232, and the
15   third log file is selected in input window 234. When
selecting the log files to be analyzed, the user may also
want to select the location to save the output file which
can be done in output window 236.

     Once the log files to be analyzed have been
20   selected, the user presses process button 238 and system
10 begins to automatically analyze the performance
contained in the log file. At step 314, system 10
selects the first performance data set in the log file to
analyze. System 10 selects the performance data set to
25   analyze by selecting the first performance data set in
the log file. A performance data set is the recorded
data and information regarding one specific participant
and one specific task for that participant. Generally in
an IVR test, a participant is given four different tasks
30   to accomplish such as "order DSL service" or "change your
billing address." For example, a performance data set

would contain the recorded information for participant A
and the task of ordering DSL service.

      An example log file 250 including two example
performance data sets 252 and 254 is shown in FIGURE 10.
5   A performance data set includes such information as the
start time of the task, each menu accessed by the
participant within the IVR, the time each menu was
accessed, how long the participant listened to each menu,
the key the participant pressed in response to the menu,
10 and the total time the participant interacted with the
IVR system.

      Performance data sets are separated in a log file by
start lines and end lines. Performance data set 252
includes start line 251 and end line 263 while
15 performance data set 254 includes start line 265 and end
line 277. Start lines 251 and 265 include the date of
the IVR test, what IVR system is being tested, and the
time that the first IVR menu begins to play. In start
line 251, the date of the test is April 5, 2002, the IVR
20 system being tested is Yahoo2 – Version B, and the first
menu began playing at 8:23:53 AM. End lines 263 and 277
include total listening time 276 and 298 which is the
total time that the participant spends listening to the
menus and interacting with the IVR system. Performance
25 data set 252 has total listening time 276 of 83 seconds
and performance data set 254 has total listening time 298
of 64 seconds. Each line in-between start lines 251 and
265 and end lines 263 and 277 provides information
regarding various submenus within the IVR accessed by the
30 participant. For performance data set 252 and line 253,
BMainMenu was accessed at 8:23:53 AM, the participant
listed to BMainMenu for 30 seconds (listening time 256),

       pressed the "2" key (key 258), and BMainMenu stopped
       playing at 8:24:23 AM. Lines 255, 257, 259, and 261
       supply the same type of information for each respective
       menu. Key 258 in line 261 is "TO" which indicates that
  5   the participant never made a selection in response to the
       "B22110" menu and therefore the participant was timed out
       of the menu.
            Once system 10 has selected the performance data set
       to be analyzed, task engine 50 determines a task code and
  10   task for the selected data set at step 316. The
       performance data sets do not contain a participant number
       identifying the participant or the task. But the
       participant number is stored in database 33 in a log-in
       call record file. When the participants access the IVR
  15   simulation application, system 10 stores in database 33
       each participant's participant number and the tasks they
       are to accomplish. Participants are generally given more
       than one task to accomplish and the participants are to
       attempt the tasks in a pre-specified order and the log
  20   files reflect this specified order of tasks. For
       example, if each participant is given four tasks to
       accomplish, then the log file includes four performance
       data sets for each participant where the four performance
       data sets for each participant are grouped together in
  25   the same sequence as the participant attempted each task.
       So if participant A was given the four tasks of "order
       DSL service," "change your billing address," "inquire
       about a bill payment," and "add call-forwarding," the log
       file has the four performance data sets for participant A
  30   one after the other in the same order as participant A
       was specified to attempt the tasks. Therefore, task
       engine 50 locates the participant number in database 33,

determines what tasks the participant was supposed to
accomplish and the order the tasks were to be
accomplished, and determines which performance data sets
correlate with which participants and tasks.

5   After task engine 50 determines the correct task for
the selected performance data set, at step 318 task
engine 50 retrieves from database 33 the correct key
sequence for the corresponding task for the selected
performance data set. Each task has a distinct correct

10   key sequence so that for example that correct key
sequence for "ordering DSL service" is different from the
correct key sequence for "changing your billing address."
The correct key sequence is the keys pressed in response
to the IVR menu prompts that allows the participant to

15   navigate the IVR menus and successfully accomplish the
assigned task. For instance, the task of "ordering DSL
service" requires the participant to navigate through and
listen to three different menus in order to order DSL
service. After the first menu, the participant needs to

20   press the "3" key which sends the participant to the
second menu. After the second menu the participant needs
to press the "2" key which sends the participant to the
third menu. After the third menu the participant needs
to press the "4" key after which the participant has

25   ordered DSL service and successfully completed the task.
Therefore the correct key sequence for the task of "order
DSL service" is "3, 2, 4."

        At step 320, performance engine 56, having the
correct key sequence from task engine 50, searches the

30   selected performance data set for the correct key
sequence. Performance engine 56 searches the last few
keys 280 for the correct data sequence. Performance

engine 56 starts with the line right above end line 277
and begins searching up the lines 275, 273, 271, 269, and
267 to start line 265 looking for the correct key
sequence. Performance engine 56 examines the end of the
5   selected performance data set because that is the only
location where the correct key sequence may be located
because when the participant enters the correct key
sequence, the task is accomplished, the performance data
set ends, and the participant moves on to the next
10 assigned task. Therefore once the participant enters the
last key of the correct key sequence, the next line in
the performance data set is end line 277 and a new
performance data set begins.

      Performance engine 56 compares the recorded key
15 sequence entered by the participant with the correct key
sequence at step 322. For example, performance data set
254 is for the task of "changing your billing address"
and the task has a correct key sequence of "2, 2, 1, 1,
5." Performance engine 56 compares the correct key
20 sequence with the recorded key sequence in performance
data set 254 beginning with line 275 which has "5" as key
280. Performance engine 56 then moves up to line 273 to
look for "1" as key 280 and finds "1" as key 280.
Performance engine 56 repeats this process for lines 271,
25 269, and 267 until a line does not have the correct key
280 or until performance engine 56 determines that the
recorded key sequence of performance data set 254 is the
same as the correct key sequence.

      Once performance engine 56 compares the correct key
30 sequence with the recorded key sequence for the selected
performance data set at step 322, at step 324 performance
engine 56 determines if the task for the selected

performance data set was successfully accomplished. The
task is successfully accomplished if the recorded key
sequence includes the correct key sequence. The task is
not successfully accomplished or is a failure if the
5   recorded key sequence does not include the correct key
sequence. If the task is not accomplished, then at step
326 performance engine 56 marks the selected performance
data set as a failure. If the task is successfully
accomplished, then at step 328 performance engine 56
10   marks the selected performance data set as a success or
as passing. For example, performance data set 252 timed
out ("TO") in line 261 because the participant made no
selection and therefore performance data set 252 cannot
have the correct key sequence and performance engine 56
15   marks performance data set 252 as failing. Determining
whether the selected performance data set accomplished
the task allows for an objective performance measure and
provides a call-routing accuracy.

        In addition to call-routing accuracy, system 10 also
20   provides for another objective performance measure – the
amount of time the participant listens to each IVR menu
and the total amount spent attempting to accomplish or
accomplishing the assigned task. The amount of time the
participant spends listening to the menu is not a very
25   valuable number unless menu duration times are also taken
into account. A menu duration time is the amount of time
it takes for a menu to play in its entirety. For
instance, a menu may have five different options to
choose from and the menu duration time is the amount of
30   time it takes for the menu to play through all five
options.

At step 330, performance engine 56 obtains the menu
duration time from database 33 for the first menu in the
selected performance data set. Performance engine 56
also obtains the listening time for the first menu in the
5   selected performance data set. The listening time is the
time a participant actually spends listening to a menu
before making a selection. For instance, performance
data set 254 contains the first menu BMainMenu that has
listening time 278 of 30 seconds (line 267). From
10 database 33, performance engine 56 retrieves that menu
BMainMenu has a menu duration time of 30 seconds.

Once performance engine 56 obtains both the
listening time and the menu duration time, performance
engine 56 calculates the response time or the cumulative
15 response time (CRT) for the first menu at step 332. The
response time is the difference between the menu duration
time and the listening time. Performance engine 56
calculates the response time by subtracting the menu
duration time from the listening time. For example, if
20 the main menu of the IVR is 20 seconds in length, and the
participant listens to the whole menu and then makes a
selection, the participant has a listening time of 20
seconds and receive a CRT score or response time of 0 (20
- 20 = 0). If the participant only listens to part of a
25 menu, hears their choice and chooses an option before the
whole menu plays, then the participant receives a
negative CRT score or response time. For instance, if
the participant chooses option three 15 seconds
(listening time) into a four-option, 20 second menu, the
30 participant receives a CRT score or response time of "-5"
(15 - 20 = -5). Conversely, the participant has a
response time of +15 if the participant were to repeat

the menu after hearing it once, and then choose option
three 15 seconds (35 second listening time) into the
second playing of the menu (35 - 20 = 15). For
performance data set 254 and line 267, the participant
5 has a response time or CRT score of 0 because the
participant has a listening time of 30 seconds and the
BMainMenu menu has a menu duration time of 30 seconds (30
- 30 = 30).

     After the calculation of the response time for the
10 first menu, performance engine 56 at step 334 determines
if the selected performance data set has additional menus
for which a response time needs to be calculated. If
there are additional menus within the selected
performance data set at step 334, then at step 336
15 performance engine 56 obtains the menu duration time from
database 33 for the next menu and the listening time for
the next menu in the same manner as performance engine 56
obtained the menu duration time and listening time for
the first menu at step 330. So for performance data set
20 254, performance engine 56 obtains the menu duration time
and listening time for line 269 and menu "B20." Once
performance engine 56 obtains the menu duration time and
the listening time for the next menu, at step 338
performance engine 56 calculates the response time for
25 the next menu in the same manner as described above at
step 332. The method then returns to step 334 where
performance engine 56 determines if the selected
performance data set has additional menus that have not
yet been analyzed. Steps 334, 336, and 338 repeat until
30 there are no additional menus to be analyzed within the
selected performance data.

        If there are no additional menus within the selected
    performance data set at step 334, then at step 340
    performance engine 56 calculates the total response time
    for the selected performance data set. The total
5   response time is the difference between the total menu
    duration time and the total listening time. Performance
    engine 56 calculates the total response time by first
    summing the menu duration times and the listening times
    for each menu within the selected performance data set.
10 Once performance engine 56 has both a total menu duration
    time and a total listening time, performance engine 56
    calculates the total response time for the selected
    performance data set by subtracting the total menu
    duration time from the total listening time. A negative
15 total response time indicates that less time was used
    than required to accomplish the task, a zero response
    time indicates that the exact amount of time was used by
    the participant to accomplish the task, and a positive
    response time indicates that more time was used than
20 required to accomplish the task. For instance,
    performance data set 64 has a total listening time 298 of
    64 seconds and a total menu duration time of 75 seconds.
    Therefore, performance data set 254 has a total response
    time of −11 seconds (64 − 75 = −11).
25   Once performance engine 56 calculates the total
    response time for the selected performance data set, at
    step 342 system 10 determines if there are additional
    performance data sets within the log file to be analyzed.
    If at step 342 there are additional performance data
30 sets, then system 10 selects the next performance data
    set at step 344 and the method returns to step 316 and
    repeats as described above until there are no additional

performance data sets in the log file or files to be
analyzed at step 342.

     When there are no additional performance data sets
to be analyzed at step 342, system 10 and performance
5   engine 56 generate an output file at step 346 and the
method ends at step 348. The output file is similar in
structure to the log file and performance data and is
sorted by participant and sequence of task. The output
file includes all the information in the log file as well
10   as additional information such as the participant number,
the assigned task, the IVR system used by the
participant, the response time for each menu, the total
response time, and whether the task was successfully
accomplished. The output file may also contain the
15   correct key sequence for each performance data set. The
output file allows a user of system 10 to determine which
IVR menu and tasks may need to be redesigned based on
high positive response times or failures to accomplish
tasks. For example, a performance data set for a
20   particular task that was successfully accomplished but
has very high response times may indicate that the menus
need to be redesigned or reworded because although the
participants accomplished the task, they had to listen to
the menus several times before being able to make a
25   selection.

     In addition to the output file, GUI 46 has an
additional feature that allows a user of system 10 to
quickly determine the reliability of IVR test results.
Summary window 240 allows the user to quickly determine
30   the pass/fail results for task accomplishment for each
participant. Because participants may not take the IVR
test seriously and others may only be taking the test to

be paid, not all of the participants actually attempt to
accomplish any of the assigned tasks. A participant
intentionally failing all assigned tasks is not good for
the overall test results and affects the analysis of the
5   IVR system. A participant failing all of their assigned
tasks is a good indication that the participant did not
really try and that the associated performance data
should be ignored when analyzing the output file.
Summary window 240 allows the user to quickly peruse each
10 participant's pass/fail results and call-routing accuracy
without having to examine the output file and therefore
determine which performance data should be disregarded
and which tasks need to be tested again.

        The call-routing and response time results of the IVR
15 usability test yield important information that can be
used in the further development and refinement of IVR
systems. Based on these measures, companies can select
IVR designs associated with the best objective
performance and usability score and have an IVR system
20 that is efficient and satisfactory to the customers.

        Further enabling a customer-centric interface design
is the ability to tailor the persona of the IVR system to
each individual customer. Referring now to FIGURES 11
through 13, a method for conducting a dialog exchange
25 between a user and an IVR system 12 is generally
depicted.   The method preferably enables an operator of
a customer service call center, for example, to achieve,
among other benefits, greater numbers of favorable
responses to system prompts by matching the active
30 persona of the IVR system 12 to one or more personality
traits or characteristics of a current caller into the
call center.

　　　In general, method 360 preferably identifies one or
more personality traits or characteristics of a caller or
user and activates an IVR system persona likely to put
the user at ease during the user's interaction with the
5　IVR system 12, elicit desirable responses to IVR system
12 prompts, such as sales prompts, as well as achieve
other benefits.

　　　Method 360 may be implemented in a variety of ways.
For example, method 360 may be implemented in the form of
10　a program of instructions storable on and readable from
executable from one or more computer readable media such
as floppy discs, CD-ROM, HDD devices, FLASH memory, etc.
Alternatively, method 360 may be implemented in one or
more ASIC (application specific integrated circuits). In
15　a further embodiment, method 360 may be implemented using
both ASIC and computer readable media. Other methods of
enabling method 360 to be stored and/or executed by a
computer system, such as system 18, are contemplated and
considered within the scope of the present invention.

20　　　Other embodiments of the invention also include
computer-usable media encoding logic such as computer
instructions for performing the operations of the
invention. Such computer-usable media may include,
without limitation, storage media such as floppy disks,
25　hard disks, CD-ROMs, read-only memory, and random access
memory; as well as communications media such as wires,
optical fibers, microwaves, radio waves, and other
electromagnetic or optical carriers. The control logic
may also be referred to as a program product.

30　　　Specifically referring to FIGURE 11, method 360
begins at 362 where IVR system 12 is preferably

initialized. Upon initialization of IVR system 12 at
362, method 360 preferably proceeds to 364.

At 364, method 360 preferably remains or loops in a
wait-state where a call from a user may be awaited. As
5   with many computer-based systems, IVR system 12 may
perform additional tasks, i.e., multi-task, while in a
wait-state at 364. In other words, IVR system 12 may
perform one or more other computing or data processing
functions while awaiting an incoming call at 364. Method
10   360 preferably maintains IVR system 12 in a wait-state at
364 while there is no call detected or being received on
communications link 16. As with many computer-based
systems, one or more escape routines may be run alongside
or in conjunction with method 360 which will enable a
15   system administrator or other IVR system 12 operator to
interrupt method 360 and thereby free up one or more
resources of IVR system 12.

Once an incoming call is detected or being received
at 364, method 360 preferably proceeds to 366 where a
20   communication connection between IVR system 12 and the
user's communications device 40 may be established. User
communication device 17 is preferably operable to allow a
user to submit voice, touch-tone or other responses to
prompts communicated from IVR system 12. Examples of
25   user communications devices include, but are not limited
to, telephones, mobile phones, PDAs (personal digital
assistant), personal computers, portable computers, etc.

As mentioned above, a user may contact IVR system 12
via communications link 16. Establishing a
30   communications connection by IVR system 12 can include
initiating a program or software sequence operable to
accept an incoming call from a calling user.

Alternatively, IVR system 12 may include functionality
operable to permit IVR system 12 to initiate contact with
one or more users. For example, IVR system 12 may be
configured with auto-dialer type capabilities. Other
5   methods of establishing a communication connection
between IVR system 12 and a user communication device 17
are contemplated within the scope and spirit of the
present invention.

     In one embodiment of method 360, IVR system 12 may
10   be configured to evaluate or identify one or more
characteristics of the call or communication connection
from the current user at 368. For example, if the user
dialed into a specific one of a plurality of IVR system
12 access numbers, the specific number dialed might be
15   associated with users from a specific geographic region,
a specific service, sale, lease or use of a specific
product, etc. In addition, IVR system 12 may also be
configured to determine whether the user is calling
during a holiday, at a particular time of day, etc. IVR
20   system 12 may be further configured with automatic number
identification (ANI), enabling IVR system 12 to identify
one or more personal, geographic or other characteristic
of the user from their calling number by referring to a
customer database.

25   Using either the information gathered from the
user's incoming call or from one or more IVR system 12
configurations and settings, method 360 preferably then
proceeds to 370 where a first prompt for the user may be
generated. Preferably, the first prompt generated by IVR
30   system 12 includes a request for a user response.
Further, the request for a user response will preferably
encourage the user to respond with a spoken or verbal

response. Depending on the type of communications link
16, and user communication device 17, the request for a
user response may assume other preferred constructs. The
text, voice, gender, rate of speech and other
5   characteristics of the first prompt may be determined or
dictated by the information gathered from the user's
incoming call, from one or more IVR system 12 settings,
as well as from other factors.

     In one embodiment of the present invention, IVR
10   system 12 may identify the user from one or more
communication link characteristics of the user's incoming
call and accesses a stored user persona profile for the
calling user, such as a persona from stored user persona
profiles 68. For example, ANI information may be used to
15   identify the caller. The stored user persona profile may
contain the IVR system 12 persona used during the user's
last call, for example. The first prompt may be
generated based on one or more speech parameters
identified in the stored user persona profile.

20   Upon generation of a first user prompt at 370,
method 360 preferably proceeds to 372. At 372, the first
user prompt may be communicated to the user. In general,
IVR system 12 preferably communicates the first prompt to
the user over communications link 16 to user
25   communication device 17 via communications interface 26.
The first prompt may be generated using one or more
speech generation applications and/or hardware devices
and according to the IVR system persona then in effect,
e.g., a default IVR system persona or an IVR system
30   persona identified from one or more call characteristics.

     Upon communication of the first prompt to the user
at 372, method 360 preferably proceeds to 374. At 374,

IVR system 12 preferably awaits a user response to the
first prompt. To avoid trapping IVR system 12 in a loop
waiting for the current user to respond to the first
prompt, if no response is detected within a reasonable

5   delay after prompting, method 360 preferably proceeds to
376. At 376, a determination is made as to whether a
predetermined amount of overall or total wait time for a
user response has been exhausted. If the predetermined
amount of overall or total wait time has not been

10   exhausted, method 360 preferably loops at 376 until such
an amount of time has lapsed or passed.

Once the predetermined wait time has been exhausted
at 376, method 360 preferably proceeds to 378. At 378,
IVR system 12 may determine whether a predetermined

15   number of first prompt communication attempts have been
exhausted. Again, to aid in the avoidance of locking IVR
system 12 in a loop waiting for a user response, a limit
to the number of first prompt communication attempts may
be implemented in method 360.

20   If at 374 a user response has not been received, at
376 the predetermined wait period for the most recent
first prompt communication has been exhausted and at 378
the number of first prompt communication retries have not
been exhausted, method 360 preferably returns to 372

25   where the first prompt may again be communicated to the
user. Upon re-prompting the user, method 360 preferably
reiterates through the processes indicated at 374, 376
and 378. However, if at 378 it is determined that the
number of first prompt communication attempts has been

30   exhausted, method 360 preferably proceeds to 380 where
the communication connection with the current user is
preferably severed. Once the communications link between

the current user and IVR system 12 has been severed,
method 360 preferably returns to 364 where the next user
call may be awaited. Other implementations of preventing
IVR system 12 from being trapped in a loop awaiting a

5   user response to an IVR system 12 prompt are contemplated
and should be included within the spirit and scope of the
present invention. For example, at block 380, IVR system
12 may transfer the caller to a human operator.

    Referring now to FIGURE 12, a flow diagram depicting

10 one embodiment of the continuation of method 360 is
illustrated. Method 360 preferably proceeds to 382 of
FIGURE 12 as a result of the detection of a user response
to the first IVR system prompt at 374 of FIGURE 11.

    At 382, the detected and received user response is

15 preferably interrogated or otherwise analyzed to identify
one or more of its characteristics. For example, if the
user response is verbal or spoken, IVR system 12 will
preferably identify one or more speech characteristics
associated with the verbal response. The characteristics

20 of speech which may be analyzed by IVR system 12 include,
but are not limited to, the speaker's gender, rate of
speech, fundamental frequency, frequency range, and
amplitude. According to behavioral research, for
example, an introvert can be discerned from an extrovert

25 by analyzing the rate, fundamental frequency, frequency
range and amplitude of the speaker's speech. Many other
speech characteristics may be identified from a speaker's
speech and used in the method of the present invention.
The delay between an IVR system 12 prompt and the user

30 response may also be monitored and analyzed by IVR system
12, for example, to determine whether the current user is
a novice or experienced IVR system 12 user. Additional

characteristics or parameters of a user's responses to
IVR system 12 prompts may be monitored and analyzed
without departing from the spirit and scope of the
present invention.

5   In one embodiment of method 360 of the present
invention, IVR system 12 may begin processing the user
response at 384 generally concurrently with the analysis
of the user response at 382. For example, if the first
prompt generated by IVR system 12 at 370 presented a

10   plurality of transaction options from which the user was
to select one, processing the user's response and
selection of a desired transaction at 384 would allow IVR
system 12 to initiate the desired user transaction.
Alternatively, if the first prompt generated by IVR

15   system 12 requested the caller's IVR system 12 user
identifier, for example, any information associated with
the user identifier stored by the IVR system 12 may be
retrieved at 384 before, after or generally concurrent
with the analysis and identification of the speech

20   characteristics of the user's response at 382.

     Once the IVR system 12 has identified one or more
characteristics or parameters of the user response
relevant for its determination of the user's personality
or demeanor at 382, method 360 preferably proceeds to

25   386. At 386, IVR system 12 may interrogate one or more
of the persona libraries 66 preferably stored in storage
system 20 on HDD device 60 and/or SAN 62. One goal of
the persona library 66 interrogation at 386 is for IVR
system 12 to identify a persona available in a persona

30   library 66 which best comports with or matches the
current personality or demeanor of the user.
Alternatively, IVR system 12 may be configured to select

from a plurality of persona characteristics to create an
IVR system persona which best matches the current
personality or demeanor of the user. By activating an
IVR system 12 persona that comports with or matches the
5   current personality or demeanor of the user, according to
teachings of the present invention, the user's
interaction with IVR system 12 is more likely to be
relaxed and the user is more likely to favorably respond
to IVR system 12 prompts.

10   According to teachings of the present invention, the
personality or demeanor of a user may be defined in a
variety of ways. For example, a user personality or
demeanor may include IVR system 12 analysis to determine
whether a user is likely a novice or experienced IVR
15 system 12 user. Further, according to aspects of the
present invention, a user's personality or demeanor may
include the gender of the caller, whether the caller may
be characterized as an introvert or extrovert, whether
the user is agitated, seems confused or is questioning
20 the system. For example IVR system 12 may be configured
to identify when a user is struggling with the system by
recognizing that a user has increased the duration and
amplitude of their speech. Further, IVR system 12 may be
configured to identify tension in a user's voice. Other
25 categories or types of user personalities or demeanors
are considered within the scope of the present invention.

     After interrogating one or more of the persona
libraries 66 preferably included on one or more HDD
device 60 or SAN 62 at 386 to identify at least one
30 preferred or optimal IVR system persona, an IVR system
persona is selected or created at 388. Upon selection of
an IVR system persona at 388, the IVR system 12 persona

may be activated at 390. Activation of an IVR system
persona may include, but is not limited to, loading one
or more person characteristic, i.e., gender, speech rate,
etc., into a memory accessible to voice generation
5   software or hardware. Once the selected IVR system 12
persona is activated at 390, method 360 preferably
proceeds to 392.

     According to teachings of the present invention, the
persona of IVR system 12 can have a significant impact on
10   the responsiveness of a user. Accordingly, selection of
a preferable, optimal or appropriate IVR system persona
and the subsequent dialog exchange with the user in
accordance with the IVR system persona provide
computer-based call centers an advantage over single
15   persona IVR system 12 based call centers.

     Generally at 392, a plurality of user prompts may be
generated by IVR system 12 in accordance with the IVR
system persona selected at 388. For example, if it is
determined that the current user is an experienced IVR
20   system 12 user, quick, brief system prompts may be
included in the preferred persona. Similarly, if it is
determined that the user is a novice user or is
struggling with system, slow, detailed instructions may
be provided in accordance with the selected or created
25   persona.

     The plurality of user prompts generated at 392 are
generally directed to completing a user desired
transaction, i.e., the purpose for which the current user
contacted IVR system 12, such as to check a balance or
30   pay on an account. Upon the generation of one or more
user prompts directed to completing a desired user
transaction, method 360 preferably proceeds to 394 where

the one or more user prompts may be communicated to the
user. For example, if IVR system 12 determines at 72
that the current user is a shy male seeking to check an
account balance, the selected IVR system persona may have
5   the characteristics of being a soft spoken male that
prompts the user for an account number, asks whether the
user would like an account statement mailed to his
address of record or whether the user would like his
balance spoken to him over the communications link, etc.
10   Once the next user prompt has been communicated to
the user at 394, method 360 preferably proceeds to 396
where a user response to the prompt is awaited. In the
event a user response is not detected within a reasonable
delay after prompting, method 50 preferably proceeds to
15   398. At 398, a determination is made as to whether a
predetermined overall or total wait period for a user
response to the IVR system 12 prompt has been exhausted.
In the event that the predetermined time period has not
been exhausted, method 360 preferably loops at 398 until
20   the predetermined time period has been exhausted. Once
the predetermined time period has been exhausted, method
360 preferably proceeds to 400.
       At 400, a determination is made as to whether a
predetermined total number of IVR system 12 prompt
25   retries has been exhausted. If the predetermined total
number of IVR system 12 prompt retries has not been
exhausted, method 360 preferably returns to 394 where the
IVR system 12 prompt directed to completing the user
desired transaction is preferably repeated to the user.
30   However, if at 400 it is determined that the
predetermined number of IVR system 12 prompt retries has
been exhausted, method 360 preferably proceeds to 402

where the communications connection with the current user
may be severed or a bail-out to a human operator
effected. Upon severance of the current user's
communications connection at 402, method 360 preferably

5   returns to 364 where the next incoming call from a user
is awaited.

Referring now to FIGURE 13, a continuation of method
360 as illustrated in FIGURES 11 and 12, is shown
according to teachings of the present invention. Method

10   360 preferably proceeds to 404 of FIGURE 13 in response
to detection or reception of a user response to the IVR
system 12 prompt directed to completing the desired user
transaction communicated at 394.

At 404, one or more parameters or characteristics of

15   the user's response are preferably identified, analyzed
or otherwise isolated. In one embodiment of the present
invention, each user response to an IVR system prompt may
be evaluated for a change in the user's personality or
demeanor. In a further embodiment, only selected user

20   responses to IVR system prompts may be evaluated for a
change in the user's personality or demeanor. As
mentioned above, generally concurrently with or after
receipt of a user response, IVR system 12 may process the
user response in furtherance of the desired user

25   transaction, as indicated at 406.

At 408, IVR system 12 preferably compares or
otherwise determines whether any differences exist
between the user's current personality or demeanor and
the personality or demeanor previously detected, e.g., at

30   382 of FIGURE 12. Specifically, according to teachings
of the present invention, IVR system 12 is attempting to
monitor the user's personality or demeanor to determine

whether a new IVR system persona or change in style of
the current persona is likely to elicit more favorable
responses from the user, put the user at ease, or
otherwise enhance the user's interaction with IVR system

5   12. In addition, IVR system 12 may be configured to
detect whether the user is having difficulty using or
interacting with the system and to access and communicate
one or more help prompts to aid the user in such
instances.

10   If at 408 a change is detected in the user's
demeanor or personality, method 360 may return to 386 of
FIGURE 12 where the one or more persona libraries 66 may
again be interrogated to identify one or more IVR system
personas which best comport or match the user's current

15   demeanor or personality. Alternatively, as mentioned
above, the style of the current persona may be changed or
one or more persona characteristics may be compiled to
create an overall IVR system persona which best matches
or comports with the user's present demeanor or

20   personality. Upon a return to 386, method 360 preferably
again proceeds through selection at 388 and activation at
390 of a new IVR system persona or style. If at 408
there is no detected change in the user's demeanor or
personality detected, method 360 preferably proceeds to

25   410.

At 410, IVR system 12 preferably determines whether
the desired user transaction has been completed, i.e.,
whether the user has received all desired information or
whether the user has provided all of the information

30   requested by IVR system 12. If it is determined at 410
that the desired user transaction is incomplete, method
360 preferably returns to 392 of FIGURE 12 where the next

prompt in the sequence of prompts directed to completing
a desired user transaction may be generated for
communication at 394.

    However, if at 410 it is determined that the desired
5   user transaction has been completed, method 360 may
proceed to 412. In one embodiment of the present
invention, personas for users of IVR system 12 may be
stored for use during subsequent transactions or dialog
exchanges with the user. In such an IVR system 12, the
10 persona for the last transaction with the current user,
for example, may be stored in one or more stored user
persona profiles 68 on one or more HDD devices 60 or SANs
62. As mentioned above, such stored user persona
profiles 68 may be used by IVR system 12 in those
15 instances where the caller can be identified prior to the
communication of the first prompt to the user as well as
in other instances.

    After the persona for the current user has been
stored, method 360 preferably proceeds to 414 where the
20 communications link with the user may be severed. Once
the communications link has been effectively severed,
method 360 preferably returns to 364 of FIGURE 11 where
IVR system 12 may await the next incoming call.

    In an embodiment of the present invention, a stored
25 user persona 68 may be used to implement one or more
security measures. For example, if a stored user persona
68 is supposed to be used by only one user, when IVR
system 12 detects a suspect voice pattern a security
alert may be generated. Such a security alert might
30 prompt the user to enter an additional password.
Alternatively, such an alert might notify IVR system 12
personnel of the potential breach and leave the matter

for the personnel to address. Other embodiments of
securing a user account using teachings of the present
invention are contemplated and considered within the
scope hereof.

5   System 10 allows for the automated creation of a
customer-centric interface that directly matches menu
prompts with customer tasks, orders and groups the tasks
and menu options by the task frequency of occurrence and
the customer perceived task relationships, and states the

10   menu prompts using the customers own terminology.
Although the present invention has been described in
detail with respect to an IVR system, system 10 may also
be utilized for the automated creation of customer-
centric interfaces for web sites with respect to

15   developing content for the web site, designs of the web
pages, and what tasks to locate on different web pages.
     The present invention allows for the automated
analysis of one or more log files containing performance
data and the generation of an output file including the

20   results of the analysis on the performance data.
Although the example embodiment is described in reference
to IVR performance data, in other embodiments IVR system
12 and computer system 18 may also automatically analyze
performance data from other systems in addition to IVR

25   systems as well as any other appropriate type of data.
     Although the present invention has been described in
detail, it should be understood that various changes,
substitutions and alterations can be made hereto without
the parting from the spirit and scope of the invention as

30   defined by the appended claims.

WHAT IS CLAIMED IS:

1.   A method for the automated creation of a customer-centric interface, the method comprising:

collecting a plurality of customer opening statements;

creating a list of a plurality of tasks for which a plurality of customers access and use the customer-centric interface;

analyzing the customer opening statements to determine a plurality of customer terminology used by the customers;

eliciting a plurality of customer feedback regarding how each task relates to each of the other tasks;

determining a frequency of occurrence for each task based on the customer opening statements;

determining which tasks to include in the customer-centric interface system based on the frequency of occurrence for the tasks;

ordering the tasks within the customer-centric interface system based on the frequency of occurrence for the tasks;

combining the tasks into one or more groups of tasks based on a plurality of customer perceived task relationships and the frequency of occurrence for the tasks;

creating a plurality of menu prompts for the customer-centric interface using the customer terminology, one or more action specific objects, and the customer perceived task relationships;

testing the customer-centric interface with one or more test customers;

providing the test customers with one or more tasks
to perform and accomplish using the customer-centric
interface;

determining if each test customer accomplished the
5   provided task;

determining a customer satisfaction value for each
test customer;

calculating a response time for each provided task;

generating a performance matrix including the
10 response times, the customer satisfaction values, and the
task accomplishment;

automatically reconfiguring the customer-centric
interface system based on the performance matrix;

implementing the customer-centric interface for
15 access and use by the customers;

monitoring the performance of the customer-centric
interface; and

modifying the customer-centric interface based on a
plurality of post-implementation results.
20

2.   A method for automating the creation of a
customer-centric interface, the method comprising:

gathering a plurality of customer intention
information;

25   automatically analyzing the customer intention
information to determine a plurality of customer
terminology, a frequency of occurrence for a plurality of
tasks, and a plurality of customer perceived task
relationships;

30   generating a plurality of menu prompts utilizing the
customer terminology and the frequency of occurrence for
the tasks;

ordering the menu prompts based on the frequency of
occurrence for the tasks and the customer perceived task
relationships;

testing the order and the terminology of the menu

5   prompts; and

modifying the order and the terminology of the menu
prompts based on the testing of the menu prompts.

3.   The method of Claim 2 wherein ordering the menu
10   prompts based on the frequency of occurrence for the
tasks and the customer perceived task relationships
comprises grouping the tasks into one or more groups of
related tasks.

15   4.   The method of Claim 2 wherein gathering a
plurality of customer intention information comprises
collecting a plurality of customer opening statements.

5.   The method of Claim 2 wherein gathering a
20   plurality of customer intention information comprises
creating a list of the tasks for which a plurality of
customers access and use the customer-centric interface.

6.   The method of Claim 2 wherein gathering a
25   plurality of customer intention information comprises
eliciting a plurality of customer feedback regarding how
each task relates to each of the other tasks.

7.   The method of Claim 2 wherein generating a
plurality of menu prompts based on the customer
terminology and the frequency of occurrence for the tasks
comprises determining which tasks to create menu prompts
5   for based on the frequency of occurrence for the tasks.

8.   The method of Claim 2 wherein testing the order
and the terminology of the menu prompts comprises
providing one or more test customers with one or more
10   tasks to accomplish using the customer-centric interface.

9.   The method of Claim 8 wherein testing the order
and the terminology of the menu prompts comprises:
      determining a customer satisfaction value for each
15   test customer;
      calculating a response time for each provided task;
and
      determining if each test customer accomplishes the
provided task.
20

10.   The method of Claim 9 wherein testing the order
and the terminology of the menu prompts comprises
generating a performance matrix including the response
time, the customer satisfaction value, and the task
25   accomplishment for each task.

11.   The method of Claim 2 further comprising:
      implementing the menu prompts as the customer-
centric interface for access and use by a plurality of
30   customers;
      monitoring the performance of the customer-centric
interface; and

modifying the menu prompts based on a plurality of
post-implementation results.

        12.   A system for the automated creation of a
5   customer-centric interface, the system comprising:
        a collection engine operable to gather a plurality
    of customer intention information;
        a customer language engine associated with the
    collection engine, the customer language engine operable
10   to determine a plurality of customer terminology and
    generate a plurality of customer-centric menu prompts for
    a plurality of tasks using the customer terminology;
        a task engine associated with the collection engine,
    the task engine operable to calculate a frequency of
15   occurrence for each task and order the customer-centric
    menu prompts based on the frequency of occurrence;
        a customer structure engine associated with the task
    engine, the customer structure engine operable to elicit
    a plurality of customer feedback regarding how each task
20   relates to each of the other tasks and generate a
    plurality of customer perceived task relationships; and
        a performance engine associated with the customer
    language engine, the task engine, and the customer
    structure engine, the performance engine operable to test
25   the customer-centric menu prompts and modify the
    customer-centric menu prompts.

        13.   The system of Claim 12 wherein the customer
    structure engine is further operable to combine the tasks
30   into one or more groups of tasks based on the customer
    perceived tasks relationships.

14. The system of Claim 12 wherein the customer intention information comprises a plurality of customer opening statements.

5   15. The system of Claim 12 wherein the customer language engine is further operable to:
       automatically identify one or more action words and one or more specific object words used by a plurality of customers interfacing with the customer-centric
10   interface; and
       identify a relationship between the actions words and the specific object words as used by the customers.

       16. The system of Claim 15 wherein the customer
15   language engine is further operable to generate the customer-centric menu prompts utilizing one or more of the action words and one or more of the specific object words.

20   17. The system of Claim 12 wherein the performance engine is further operable to calculate a response time for each customer-centric menu prompt tested.

       18. The system of Claim 12 wherein the performance
25   engine is further operable to generate a performance matrix including one or more test results from the testing of the customer-centric menu prompts.

19.   A method for automatically creating and integrating interface structure into a customer-centric interface, the method comprising:

compiling a list of a plurality of tasks for which a plurality of customers access and use the customer-centric interface;

eliciting a plurality of customer feedback regarding how each task in the list relates to each of the other tasks in the list;

aggregating the customer feedback;

automatically analyzing the aggregated customer feedback to determine one or more customer perceived task relationships; and

structuring the customer-centric interface in accordance with the customer perceived task relationships.

20.   The method of Claim 19 wherein compiling a list of a plurality of tasks for which a plurality of customers access and use the customer-centric interface system comprises utilizing a task frequency of occurrence to determine the tasks that are included in the list of the tasks.

21.   The method of Claim 19 wherein eliciting a plurality of customer feedback comprises performing one or more customer exercises designed to reveal how the customers perceive one or more relationships between the tasks.

22.   The method of Claim 19 wherein automatically
analyzing the aggregated customer feedback to determine
one or more customer perceived task relationships
comprises determining which of the tasks can be combined
5   into one or more groups of tasks based on the customer
perceived task relationships.

23.   The method of Claim 22 further comprising
eliciting customer feedback regarding one or more labels
10   for each of the groups of tasks.

24.   The method of Claim 19 wherein automatically
analyzing the aggregated customer feedback to determine
one or more customer perceived task relationships
15   comprises representing the customer perceived task
relationships in a numerical data matrix.

25.   The method of Claim 24 further comprising
automatically generating a graphical representation of
20   the customer perceived task relationships based on the
numerical data matrix to enable the application of the
customer perceived task relationships to the interface
structure of the customer-centric interface.

25   26.   The method of Claim 19 wherein structuring the
customer-centric interface in accordance with the
customer perceived task relationships comprises
organizing the tasks within the customer-centric
interface in accordance with the customer perceived task
30   relationships.

27. The method of Claim 19 wherein structuring the
customer-centric interface system in accordance with the
customer perceived task relationships comprises combining
the tasks into one or more groups of tasks based on the
5   customer perceived task relationships.

28. The method of Claim 27 wherein combining the
tasks into one or more groups of tasks based on the
customer perceived task relationships comprises:
10   ordering the groups of tasks; and
ordering the tasks within each group of tasks.

29. A method for automatically developing customer-
centric menu prompts for a customer-centric interface,
15   the method comprising:
automatically identifying one or more action words
and one or more object words used by a plurality of
customers interfacing with the customer-centric
interface;
20   determining which of the action words are specific
and which of the object words are specific;
identifying a relationship between the actions words
and the object words as used by the customers;
determining a frequency of occurrence for each of
25   the object words and each of the action words;
storing the specific actions words and the specific
object words in one or more databases; and
automatically generalizing the specific action words
into one or more general groups of specific action words
30   and the specific object words into one or more general
groups of specific object words.

30.   The method of Claim 29 wherein automatically
identifying one or more action words and one or more
object words comprises locating one or more of the object
words and one or more of the action words in a plurality
5   of customer opening statements.

31.   The method of Claim 29 wherein storing the
specific action words and the specific object words
comprises storing the specific action words and the
10   specific object words in accordance with the frequency of
occurrence.

32.   The method of Claim 29 wherein storing the
specific actions words and the specific object words in
15   one or more databases comprises storing the specific
action words in a specific action database.

33.   The method of Claim 29 wherein storing the
specific actions words and the specific object words in
20   one or more databases comprises storing the specific
object words in a specific object database.

34.   The method of Claim 29 wherein storing the
specific actions words and the specific object words in
25   one or more databases comprises maintaining the
relationship between the specific action words and the
specific object words when storing the specific action
words and the specific object words.

30   35.   The method of Claim 34 wherein maintaining the
relationship between the action words and the object
words comprises linking one or more of the specific

action words in a specific action database to one or more
related specific object words in a specific object
database.

5   36. The method of Claim 29 wherein generalizing the
specific action words into one or more groups of specific
action words and the specific object words into one or
more groups of specific object words comprises:
        determining one or more commonalties between the
10   specific action words;
        determining one or more commonalties between the
specific object words;
        grouping together the specific action words having
the commonality; and
15   grouping together the specific object words having
the commonality.

        37. The method of Claim 29 wherein automatically
generalizing the specific action words into one or more
20   groups of specific action words and the specific object
words into one or more groups of specific object words
comprises determining a particular general object word
for each group of specific object words and a particular
general action word for each group of specific action
25   words.

        38. The method of Claim 37 further comprising:
        storing the general object words in a general object
database; and
30   storing the general action words in a general action
database.

39.   The method of Claim 29 wherein identifying a
relationship between the actions words and the object
words comprises tracking how the customers use the
actions words and the object words together.

5

40.   The method of Claim 29 further comprising
creating a plurality of customer-centric menu prompts
using one or more of the specific action words and one or
more of the specific object words.

10

41.   The method of Claim 40 wherein creating the
customer-centric menu prompts comprises automatically
retrieving one or more of the specific action words and
one or more of the specific object words from one or more
15 of the databases.

42.   Software for automating the creation of a
customer-centric interface, the software embodied in a
computer-readable medium and operable to:
20   gather a plurality of customer intention
information;
        automatically analyze the customer intention
information to determine a plurality of customer
terminology, a frequency of occurrence for a plurality of
25 tasks, and a plurality of customer perceived task
relationships;
        generate a plurality of menu prompts utilizing the
customer terminology and the frequency of occurrence for
the tasks;

order the menu prompts based on the frequency of
occurrence for the tasks and the customer perceived task
relationships;

test the menu prompts; and

5   modify the menu prompts based on the testing of the
menu prompts.

43.   The software of Claim 42 wherein ordering the
menu prompts based on the frequency of occurrence for the
10   tasks and the customer perceived task relationships
comprises grouping the tasks into one or more groups of
related tasks.

44.   The software of Claim 42 wherein generating a
15   plurality of menu prompts based on the customer
terminology and the frequency of occurrence for the tasks
comprises determining which tasks to create menu prompts
for based on the frequency of occurrence for the tasks.

20   45.   The software of Claim 42 wherein testing the
menu prompts comprises:

determining a customer satisfaction value;

calculating a response time for each task; and

determining a task accomplishment for each task.

25

46.   The software of Claim 45 wherein testing the
menu prompts comprises generating a performance matrix
including the response time, the customer satisfaction
value, and the task accomplishment for each task.

47.   The software of Claim 42 further operable to:

implement the menu prompts as the customer-centric
interface for access and use by a plurality of customers;

monitor the performance of the customer-centric
interface; and

modify the menu prompts based on a plurality of
post-implementation results.

48.   A method for the automated analysis of
interactive voice response system performance data, the
method comprising:

determining a task for a performance data set;

retrieving a correct key sequence for the task;

searching for the correct key sequence at the end of
the performance data set;

automatically comparing the correct key sequence for
the task with a recorded key sequence of the performance
data set;

determining if the task was successfully completed
based on the comparison of the correct key sequence and
the recorded key sequence based on the recorded key
sequence corresponding with the correct key sequence;

scoring the performance data set as successful or
unsuccessful;

obtaining one or more menu duration times;

automatically calculating one or more response times
for one or more menus by subtracting the menu duration
time from a listening time for each menu;

calculating a total response time for the
performance data set; and

generating an output file sorted by a participant
number and by a task number.

49. A method for the automated analysis of performance data, the method comprising:

determining a task for a performance data set;

retrieving a correct key sequence for the task;

automatically comparing the correct key sequence for the task with a recorded key sequence of the performance data set; and

automatically calculating one or more response times.

50. The method of Claim 49 wherein calculating one or more response times comprises calculating a response time for an individual menu.

51. The method of Claim 49 wherein calculating one or more response times comprises calculating a total response time for the performance data set.

52. The method of Claim 49 wherein calculating the response time comprises obtaining one or more menu duration times.

53. The method of Claim 52 wherein calculating a response time comprises subtracting the menu duration time from a listening time.

54. The method of Claim 49 wherein determining a task for the performance data set comprises matching a participant number of the performance data set and a sequence number of the performance data set to one of a plurality of tasks in a database.

55.   The method of Claim 49 wherein comparing the
correct key sequence with a recorded key sequence
comprises determining the task is successfully completed
if the recorded key sequence corresponds with the correct
5   key sequence.

56.   The method of Claim 49 wherein comparing the
correct key sequence with a recorded key sequence
comprises searching for the correct key sequence at the
10   end of the performance data set.

57.   The method of Claim 49 further comprising
generating an output file.

15   58.   The method of Claim 57 wherein generating the
output file comprises sorting the output file by a
participant number and by the order in which a
participant performed the task.

20   59.   Software for the automated analysis of
performance data, the software embodied in a computer-
readable medium and operable to:
      determine a task for a performance data set;
      retrieve a correct key sequence for the task;
25   automatically compare the correct key sequence for
the task with a recorded key sequence of the performance
data set; and
      automatically calculate one or more response times.

30   60.   The software of Claim 59 wherein calculating
one or more response times comprises calculating a
response time for one or more menus.

61.   The software of Claim 59 wherein calculating
one or more response times comprises calculating a total
response time for the performance data set.

5   62.   The software of Claim 59 wherein calculating
the response time comprises obtaining one or more menu
duration times.

63.   The software of Claim 62 wherein calculating a
10   response time comprises subtracting the menu duration
time from a listening time.

64.   The software of Claim 59 wherein determining a
task for the performance data set comprises matching a
15   participant number of the performance data set and a
sequence number of the performance data set to one of a
plurality of tasks in a database.

65.   The software of Claim 59 wherein comparing the
20   correct key sequence with a recorded key sequence
comprises determining the task is successfully completed
if the recorded key sequence corresponds with the correct
key sequence.

25   66.   The software of Claim 59 wherein comparing the
correct key sequence with a recorded key sequence
comprises searching for the correct key sequence at the
end of the performance data set.

30   67.   The software of Claim 59 further operable to
generate an output file sorted by a participant number

and by the order in which a participant performed the task.

68.   A system for the automated analysis of
performance data, the system comprising:

a plurality of performance data sets;

a task engine operable to determine a task for each performance data set and retrieve a correct key sequence for each task; and

a performance engine associated with the task engine, the performance engine operable to compare the correct key sequence for the task with a recorded key sequence of the performance data set and calculate one or more response times.

69.   The system of Claim 68 wherein the performance engine calculates a response time for one or more menus.

70.   The system of Claim 68 wherein the performance engine calculates a total response time for each performance data set.

71.   The system of Claim 68 wherein the performance engine obtains one or more menu duration times.

72.   The system of Claim 71 wherein the performance engine subtracts the menu duration time from a listening time in order to calculate the response time.

73.   The system of Claim 68 wherein the performance engine subtracts a menu duration time from a listening time in order to calculate the response time.

74.   The system of Claim 68 wherein the task engine
matches a participant number of the performance data set
and a sequence number of the performance data set to one
of a plurality of tasks in a database.

5

75.   The system of Claim 68 wherein the performance
engine is further operable to determine if the task was
successfully completed based on the recorded key sequence
corresponding with the correct key sequence.

10

76.   The system of Claim 68 wherein the performance
engine is further operable to generate an output file.

77.   The system of Claim 68 wherein the tasks
15   comprise a plurality of simulated interactions with an
interactive voice response system.

78.   The system of Claim 68 further comprising a
graphical user interface associated with the task engine
20   and the performance engine, the graphical user interface
having a summary window and operable to allow for the
selection of the performance data set to be analyzed.

79.   A method of operating an interactive voice
25   response (IVR) system comprising:
        establishing a communication connection with a user;
        generating a first prompt, the first prompt operable
to elicit a response;
        communicating the first prompt to the user;
30   awaiting a response from the user to the first
prompt;

analyzing at least one aspect of the response to
identify at least one characteristic relevant to IVR
system persona selection;

interrogating a library of personas to identify a
5 persona which comports with the at least one identified
characteristic;

selecting the identified persona from the library of
personas;

activating the selected persona, the selected
10 persona operable to generate and communicate one or more
subsequent IVR system prompts directed to continuing a
desired user transaction;

monitoring responses from the user to the subsequent
IVR system prompts;

15   analyzing at least one user response to the
subsequent prompts to identify a change in a user
characteristic relevant to IVR system persona selection;
and

modifying a style of the selected person in response
20 to the identified change in the user characteristic
relevant to IVR system persona selection.

80. A method for conducting a dialog exchange
between an interactive voice response (IVR) system and a
25 user comprising:

identifying at least one user personality trait;

automatically selecting an IVR system persona based
on the identified user personality trait; and

activating the selected IVR system persona.

30

81.   The method of Claim 80, further comprising:

generating, by the IVR system, a first prompt
requesting a user response; and

communicating the first prompt to the user.

5

82.   The method of Claim 81, further comprising
generating the first prompt based on at least one call
characteristic.

10   83.   The method of Claim 81, further comprising
identifying the user personality trait based on the user
response to the first prompt.

84.   The method of Claim 81, further comprising
15 identifying the user personality trait from at least one
speech characteristic associated with a user's verbal
response to the first prompt.

85.   The method of Claim 81, further comprising:
20   generating, in accordance with one or more IVR
system persona parameters, at least one additional
prompt, the additional prompt associated with continuing
a desired user transaction; and

communicating the additional prompt to the user.

25

86.   The method of Claim 85, further comprising:

analyzing at least one aspect of a user response to
the additional prompt; and

determining from the at least one aspect of the user
30 response, whether a user personality trait associated
with the user response suggests a change for the selected
persona.

87. The method of Claim 86, further comprising
automatically selecting a new style for the selected
persona in response to determining that the user
personality train suggests a change for the selected
5   persona.

88. The method of Claim 86, further comprising
automatically selecting a new IVR system persona in
response to determining that the user personality trait
10 suggests a change for the selected persona.

89. The method of Claim 86, further comprising
repeating the analyzing and determining steps during the
prompt and response dialog exchange such that a new IVR
15 system persona may be selected in response to an
identified change in a user personality trait.

90. The method of Claim 80, further comprising
selecting the IVR system persona from a library of
20 personas operably associated with the interactive voice
response system.

91. An interactive voice response (IVR) system
comprising:
25   at least one processor;
        memory operably coupled to the processor; and
        a program of instructions storable in the memory and
executable in the processor, the program of instructions
operable to generate and exchange dialog with a user in
30 accordance with an IVR system persona selected from a
library of personas; wherein the program of instructions

automatically selects the persona according to at least
one personality characteristic of the user.

92.   The system of Claim 91, further comprising:

5   a communications interface; and

the program of instructions further operable to
select a first prompt based on at least one call
characteristic, the first prompt operable to request a
response from the user; and

10   communicate the first prompt to the user via the
communications interface.

93.   The system of Claim 92, further comprising the
program of instructions further operable to identify the

15 at least one personality characteristic of the user from
the user response to the first prompt.

94.   The system of Claim 93, further comprising the
program of instructions further operable to identify at

20 least one speech parameter of a verbal user response to
the first prompt and determine the at least one
personality characteristic of the user from the
identified speech parameter.

25   95.   The system of Claim 91, further comprising the
program of instructions further operable to identify a
desired user transaction, generate at least one
additional prompt directed to completion of the desired
user transaction and communicate the at least one

30 additional prompt to the user.

96.   The system of Claim 95, further comprising the
program of instructions further operable to interrogate a
user response to the additional prompt and determine,
based on the interrogation, whether the user response to
5   the additional prompt suggests a need for an IVR system
persona change.

97.   The system of Claim 96, further comprising the
program of instructions further operable to select a new
10 IVR system persona in response to the suggestion of a
need for a new IVR system persona and activate the new
IVR system persona.

98.   The system of Claim 96, further comprising the
15 program of instructions further operable to automatically
select a new style for the selected persona in response
to determining that the user personality characteristic
suggests a change for the selected persona.

20   99.   The system of Claim 91, further comprising:
a component systems interface operably coupled to
the processor;
at least one component storage system operably
coupled to the component systems interface; and
25   the library of personas stored on the at least one
component storage system.

100. A dialog exchange system comprising:
at least one processor;
30   memory operably coupled to the processor;
a communications interface operably coupled to the
processor, the communications interface operable to

communicate dialog between a user and the system via a
communications link;

a component systems interface operably coupled to
the processor, the component systems interface operable
5   to transmit information to and receive information from
at least one storage device;

a library of personas stored on the at least one
storage device, each persona in the library corresponding
to one or more user personality traits; and

10   a program of instructions storable in the memory and
executable in the processor, the program of instructions
operable to identify at least one user personality trait
and activate a dialog exchange system persona selected
from the library of personas according to the at least

15   one identified user personality trait.

101. The dialog exchange system of Claim 100,
further comprising the program of instructions further
operable to generate one or more prompts directed to
20   completing a desired user transaction and analyze one or
more selected user responses to the one or more prompts
to determine whether the selected dialog exchange system
persona should be changed.

25   102. The dialog exchange system of Claim 101,
further comprising the program of instructions further
operable to change the dialog exchange system persona in
response to a determination that the selected dialog
exchange system persona should be changed, and monitor
30   user responses to prompts generated in accordance with
the changed dialog exchange system persona such that a

determination may be made as to the need for yet another
change to the dialog exchange system persona.

     103. A computer readable medium encoding a program
5 of instructions, the program of instructions operable to:
      automatically select an interactive voice response
(IVR) system persona based on at least one personality
trait identified in a user response; and
     conduct a dialog exchange in accordance with the
10 selected IVR system persona.

     104. The computer readable medium of Claim 103,
wherein the program of instructions is further operable
to select the IVR system persona from a library of
15 personas.

     105. The computer readable medium of Claim 103,
wherein the program of instructions is further operable
to create a user persona from a plurality of IVR system
20 persona characteristics.

     106. The computer readable medium of Claim 103,
wherein the program of instructions is further operable
to monitor user responses to subsequent IVR system
25 prompts to determine whether a change in one or more user
personality traits suggests a need for changing the
selected IVR system persona.

107. The computer readable medium of Claim 106,
wherein the program of instructions is further operable
to:

    select a new IVR system persona in response to the
5   suggestion of a need; and

    conduct a dialog exchange directed to completing a
user desired transaction in accordance with the newly
selected IVR system.

10   108. The computer readable medium of Claim 106,
wherein the program of instructions is further operable
to automatically select a new style for the selected
persona in response to detecting the need for changing
the selected IVR system persona.

15

    109. The computer readable medium of Claim 103,
wherein the program of instructions is further operable
to select an IVR system persona from a plurality of user
personality traits identified in a verbal user response.

20

    110. A method for categorizing customer service
opening statements, the method comprising:

    collecting a plurality of opening statements to be
categorized;

25   creating one or more rules for categorizing the
opening statements;

    grouping the rules into one or more sets of rules;

    storing the sets of rules;

    selecting one of the sets of rules to apply to the
30 opening statements;

automatically applying the rules in accordance with
a rule hierarchy to a list of the opening statements one
opening statement at a time;

5   searching each opening statement for one or more
text string combinations;

automatically determining a category label for each
opening statement based upon the presence of one or more
of the text string combinations;

assigning a category label to each opening statement
10   when each opening statement first satisfies one of the
rules; and

creating an output file including each opening
statement and a corresponding category label.

15   111. A method for the automated categorization of
statements, the method comprising:

creating one or more rules for categorizing the
statements;

selecting one or more of the rules to apply to the
20   statements;

automatically applying the rules to a list of the
statements; and

automatically determining a category label for each
statement based upon the rules.

25   .

112. The method of Claim 111 wherein automatically
applying the rules to a list of the statements comprises
retrieving one or more of the rules to be applied to the
statements.

113. The method of Claim 111 wherein creating one or more rules comprises grouping the rules into one or more sets of rules.

5   114. The method of Claim 111 further comprising creating an output file including each statement and a corresponding category label.

115. The method of Claim 111 wherein automatically
10 applying the rules to a list of the statements comprises applying the rules to the statements one statement at a time.

116. The method of Claim 111 further comprising
15 determining a rule hierarchy for applying the rules to the statements.

117. The method of Claim 116 wherein automatically applying the rules to a list of the statements comprises
20 applying the rules to the statements in a particular rule order in accordance with the rule hierarchy.

118. The method of Claim 111 wherein automatically applying the rules to a list of the statements comprises
25 searching each statement for one or more text string combinations.

119. The method of Claim 111 wherein creating one or more rules comprises editing one or more existing rules.
30
120. The method of Claim 111 wherein automatically determining a category label for each statement comprises

assigning a category label for each statement when each
statement first satisfies one of the rules.

    121. The method of Claim 111 wherein the rules
5   include a catch all rule for categorizing statements that
    do not satisfy any of the other rules.

    122. The method of Claim 111 wherein the statements
    comprise a plurality of opening statements.
10

    123. The method of Claim 111 further comprising
    storing the rules.

    124. The method of Claim 111 further comprising
15 collecting a plurality of statements to be categorized.

    125. Software for the automated categorization of
    statements, the software embodied in a computer-readable
    medium and operable to:
20   create one or more rules for categorizing the
    statements;
        select one or more of the rules to apply to the
    statements;
        automatically apply the rules to a list of the
25 statements; and
        determine a category label for each statement based
    upon the rules.

    126. The software of Claim 125 wherein the
30 statements comprise a plurality of opening statements.

127. The software of Claim 125 further operable to create an output file, the output file including each statement and a corresponding category label.

5   128. The software of Claim 127 wherein creating the output file comprises entering each statement and each corresponding category label into a spreadsheet.

       129. The software of Claim 125 wherein creating one
10 or more rules comprises grouping the rules into one or more sets of rules.

       130. The software of Claim 125 further operable to display a graphical user interface.
15

       131. The software of Claim 125 wherein applying the rules to a list of the statements comprises applying the rules to the statements in a particular rule order in accordance with a rule hierarchy.
20

       132. The software of Claim 125 wherein applying the rules to a list of the statements comprises searching each statement for one or more text string combinations.

25   133. The software of Claim 125 further operable to store the rules.

       134. The software of Claim 125 further operable to assign a category label to each statement when each
30 statement first satisfies one of the rules.

135. A system for the automated categorization of
statements, the system comprising:
      a plurality of rules
      a rule engine operable to create and store the rules
5   used to categorize the statements; and
      a performance engine associated with the rule
engine, the performance engine operable to automatically
apply the rules to the statements and determine a
category label for each statement.
10

136. The system of Claim 135 wherein the statements
comprise a plurality of opening statements.

137. The system of Claim 135 further comprising a
15   graphical user interface associated with the rule engine
and the performance engine, the graphical user interface
operable to display the rules and the category labels.

138. The system of Claim 135 wherein the performance
20   engine is further operable to create an output file.

139. The system of Claim 138 wherein the output file
includes each statement and a corresponding category
label.
25

140. The system of Claim 135 wherein the rule engine
is further operable to group the rules into one or more
sets of rules.

30   141. The system of Claim 135 wherein the performance
engine searches each statement for one or more text

string combinations to determine a category label for
each statement.

    142. The system of Claim 135 wherein the rules
5   include a catch-all rule for categorizing statements that
do not satisfy any of the other rules.

    143. The system of Claim 135 wherein the performance
engine applies the rules to the statements in a
10 particular rule order in accordance with a rule
hierarchy.

FIG. 1

FIG. 2A

70 — (START)

72 — COLLECT CUSTOMER
OPENING STATEMENTS

74 — DETERMINE THE TERMINOLOGY
USED BY THE CUSTOMERS

76 — CREATE A LIST OF TASKS FOR WHICH
THE CUSTOMERS ACCESS THE
CUSTOMER-CENTRIC INTERFACE

78 — DETERMINE A FREQUENCY OF
OCCURRENCE FOR EACH TASK

80 — DETERMINE WHICH TASKS TO INCLUDE
IN THE CUSTOMER-CENTRIC INTERFACE

82 — ELICIT CUSTOMER FEEDBACK ON HOW
THE TASKS RELATE TO EACH OTHER

84 — COMBINE THE TASKS INTO
GROUPS OF RELATED TASKS

86 — ORDER THE TASKS WITHIN THE
CUSTOMER-CENTRIC INTERFACE

88 — CREATE CUSTOMER-CENTRIC
MENU PROMPTS

A

TO FIG. 2B

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FROM FIG. 2A

A

90 — TEST THE CUSTOMER-CENTRIC
        INTERFACE

92 — ANALYZE THE RESULTS OF THE TESTING
        OF THE CUSTOMER-CENTRIC INTERFACE

94 — ARE THERE
        CUSTOMER-CENTRIC   NO
        MENU PROMPTS OR TASKS
        HAVING UNSATISFACTORY
        PERFORMANCE
        ?

FIG. 2B

YES

96 — SELECT THE FIRST CUSTOMER-CENTRIC
        MENU PROMPT OR TASK HAVING
        UNSATISFACTORY PERFORMANCE

98 — DETERMINE THE REASON FOR THE
        UNSATISFACTORY PERFORMANCE OF THE
        CUSTOMER-CENTRIC MENU PROMPT OR TASK

100 — MODIFY THE UNSATISFACTORY
         CUSTOMER-CENTRIC MENU PROMPT OR TASK

ARE THERE
ADDITIONAL CUSTOMER-
NO   CENTRIC MENU PROMPTS OR TASKS
HAVING UNSATISFACTORY
PERFORMANCE?

102

YES

104 — SELECT THE NEXT CUSTOMER-CENTRIC
         MENU PROMPT OR TASK HAVING
         UNSATISFACTORY PERFORMANCE

IMPLEMENT THE
CUSTOMER-CENTRIC   — 106
INTERFACE

CONTINUALLY MONITOR
THE PERFORMANCE OF
THE CUSTOMER-CENTRIC   — 108
INTERFACE

MODIFY THE
CUSTOMER-CENTRIC
INTERFACE BASED ON
POST-IMPLEMENTATION   — 110
RESULTS

END

FIG. 3

120

RANK	TASK	FREQUENCY
1	LINE NOT WORKING 127	14.00%
2	SERVICE NOT WORKING 129	11.60%
3	GET INFORMATION ($, AVAILABLE) 131	11.30%
4	CHECK MY ORDER 133	6.70%
5	SOFTWARE NOT WORKING 135	5.60%
6	TECHNICIAN VISIT 137	3.80%
7	HELP WITH EMAIL 139	3.80%
8	HELP WITH INSTALL 141	3.80%
9	INTERNET NOT WORKING 143	3.50%
10	REGISTRATION 145	3.40%
11	ORDER SERVICE 147	3.00%
12	CANCEL SERVICE 149	2.10%
13	TROUBLE TICKET 151	1.90%
14	HELP WITH PASSWORD 153	1.40%
15	SERVICE DUE DATE 155	1.10%
16	BILLING ISSUE 157	1.10%
17	HARDWARE NOT WORKING 159	1.10%
18	SERVICE ACTIVATED YET? 161	1.00%
	TOTAL	80.20%

122   124   126

5/14

FIG. 4

FIG. 5

FIG. 6

FIG. 7

180 — START

182 — SELECT STATEMENTS TO BE CATEGORIZED

184 — CREATE NEW RULES TO APPLY TO THE STATEMENTS? — NO → SELECT AND EDIT RULES TO USE TO CATEGORIZE FROM LIST OF EXISTING RULES — 196

↓ YES

186 — CREATE THE RULES FOR CATEGORIZING THE STATEMENTS

188 — GROUP THE RULES INTO A SET OF RULES

190 — ARRANGE THE RULES IN ACCORDANCE WITH A RULE HIERARCHY

192 — STORE THE NEWLY CREATED RULES AND NEWLY CREATED SET OF RULES

194 — SELECTING A SET OF RULES TO USE

198 — APPLY THE RULES TO THE STATEMENTS IN ACCORDANCE WITH THE RULE HIERARCHY

200 — APPLY THE FIRST RULE IN THE RULE HIERARCHY TO A STATEMENT

A

204 — ARE THERE ADDITIONAL RULES TO CATEGORIZE THE STATEMENT? — NO

↓ YES

206 — APPLY THE NEXT RULE IN THE RULE HIERARCHY TO THE STATEMENT

202 — DOES THE STATEMENT SATISFY THE RULE? — NO

A

↓ YES

208 — ASSIGN THE CATEGORY LABEL ASSOCIATED WITH THE SATISFIED RULE TO THE STATEMENT

210 — CATEGORIZE STATEMENT AS NOT SATISFYING ANY OF THE SELECTED RULES

212 — ARE THERE ADDITIONAL STATEMENTS TO CATEGORIZE? — NO

↓ YES

214 — APPLY THE FIRST RULE IN THE RULE HIERARCHY TO THE NEXT STATEMENT

216 — CREATE THE OUTPUT FILE

END — 218

FIG. 8

46

Input File 1

C:\Documents and Settings\mills\My
Documents\SBC\Yahoo DSL Data\even.txt

230

Select Input File...   Open Input File...

Input File 2

Help

232

C:\Documents and Settings\mills\My
Documents\SBC\Yahoo DSL Data\odd.txt

Select Input File...   Open Input File...

Input File 3:

Help

234

Select Input File...   Open Input File...

Output File: (Any existing file will be overwritten.)

236

C:\Documents and Settings\mills\My
Documents\SBC\Yahoo DSL Data\out5.txt

Select Output File...   Open Output File...

Save Settings

Process Input Files   Exit

238

Participant Performance Summary:

PartNum	Score1	Score2	Score3	Score4	Score5?
4	PASS	PASS	PASS	PASS	PASS

240

250

251 — 4/5/02,Start of Yahoo2-Version B, 8:23:53 AM
                              256 258
253 — BMainMenu, 8:24:23 AM, 30, 2
                          256 258
255 — ,B20, 8:24:34 AM, 11, 2
                          256 258
257 — ,B220, 8:24:38 AM, 4, 1   — 252
                          256   258
259 — ,B2210, 8:24:41 AM, 3, 1
                          256   258
261 — ,B22110, 8:24:16 AM, 35, TO

263 — ,ANN 101 Total, ,83
                      276

FIG. 9

265 — 4/5/02,Start of Yahoo2-Version B, 8:23:53 AM
                              278 280
267 — BMainMenu, 8:24:23 AM, 30, 2
                          278   280
269 — ,B20, 8:24:34 AM, 11, 2
                          278 280
271 — ,B220, 8:24:38 AM, 4, 1   — 254
                          278 280
273 — ,B2210, 8:24:41 AM, 3, 1

275 — ,B22110, 8:24:57 AM, 16, 5
                              278 280
277 — ,ANN 101 Total, ,64
                      298

FIG. 10

310 — START

312 — SELECT THE PERFORMANCE DATA LOG FILES TO BE ANALYZED

314 — SELECT THE FIRST PERFORMANCE DATA SET IN THE LOG FILE TO BE ANALYZED

316 — DETERMINE A TASK CODE AND A TASK FOR THE SELECTED PERFORMANCE DATA SET

318 — RETRIEVE THE CORRECT KEY SEQUENCE FOR THE SELECTED PERFORMANCE DATA SET

320 — SEARCH THE SELECTED PERFORMANCE DATA SET FOR THE CORRECT KEY SEQUENCE

322 — COMPARE THE RECORDED KEY SEQUENCE IN THE SELECTED PERFORMANCE DATA SET WITH THE CORRECT KEY SEQUENCE

324 WAS THE TASK SUCCESSFULLY COMPLETED FOR THE SELECTED PERFORMANCE DATA SET?

NO

326 — MARK THE SELECTED PERFORMANCE DATA SET AS A FAILURE

YES

MARK THE SELECTED PERFORMANCE DATA SET AS A PASS — 328

330 — OBTAIN THE MENU DURATION TIME AND THE LISTENING TIME FOR THE FIRST MENU IN THE SELECTED PERFORMANCE DATA SET

CALCULATE THE RESPONSE TIME FOR THE FIRST MENU — 332

334 ARE THERE ADDITIONAL MENUS IN THE SELECTED PERFORMANCE DATA SET?

YES

NO

DETERMINE THE TOTAL RESPONSE TIME FOR THE SELECTED PERFORMANCE DATA SET

340

336 — OBTAIN THE MENU DURATION TIME AND LISTENING TIME FOR THE NEXT MENU

338 — CALCULATE THE RESPONSE TIME FOR THE NEXT MENU

342 ARE THERE ADDITIONAL PERFORMANCE DATA SETS IN THE LOG FILE?

NO

YES

344 — SELECT THE NEXT PERFORMANCE DATA SET

346 — GENERATE THE OUTPUT FILE

348 — END

FIG. 11

362 — SYSTEM INITIALIZATION

FROM FIGS. 12,13

360

C

364

AWAIT INCOMING CALL — NO CALL DETECTED

INCOMING CALL DETECTED

366 — ESTABLISHED COMMUNICATION LINK BETWEEN INCOMING CALL AND IVR SYSTEM

368 — EVALUATED CALL CHARACTERISTICS

370 — GENERATE FIRST USER PROMPT

372 — COMMUNICATE FIRST PROMPT TO USER

374

AWAIT USER RESPONSE — NO RESPONSE

RESPONSE RECEIVED

B

TO FIG. 12

WAIT PERIOD EXHAUSTED? — NO

376

YES

RETRIES EXHAUSTED? — NO

378

YES

SEVER COMMUNICATION LINK — 380

FIG. 12

FROM
FIG. 11
B

FROM
FIG. 13
E   382 — ANALYZE USER RESPONSE - - - - → PROCESS USER RESPONSE   384

360

386 — INTERROGATE PERSONA LIBRARY

FROM
FIG. 13   388 — SELECT PERSONA FROM LIBRARY

F   390 — ACTIVATE PERSONA

392 — GENERATE PROMPTS DIRECTED
TO COMPLETING DESIRED
USER TRANSACTION

394 — COMMUNICATE FIRST
PROMPTS TO USER

396

RESPONSE
RECEIVED   AWAIT USER
RESPONSE

D

TO
FIG. 13   NO RESPONSE

WAIT PERIOD   NO
EXHAUSTED?

398   YES

RETRIES   NO
EXHAUSTED?

400   YES

402 — SEVER COMMUNICATION LINK

C

TO FIG. 11

FIG. 13

FROM
FIG. 12

D

360

406

404 — ANALYZE CHARACTERISTICS
OF USER RESPONSE ---- PROCESS USER RESPONSE

408

CHANGES IN
CHARACTERISTICS OF USER   YES
RESPONSE?

E

TO
FIG. 12

NO

IS
TRANSACTION   NO
COMPLETE?

410   F

YES   TO
FIG. 12

412 — STORE PERSONA FOR
CURRENT USER

414 — SEVER COMMUNICATION LINK

C

TO
FIG. 11

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DECLARATION OF NON-ESTABLISHMENT OF INTERNATIONAL SEARCH REPORT

(PCT Article 17(2)(a), Rules 13ter.1(c) and Rule 39)

Applicant's or agent's file reference	IMPORTANT DECLARATION	Date of mailing *(day/month/year)*
064198.0172		16/07/2004
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G06F9/44		
Applicant		
SBC PROPERTIES, L.P.		

This International Searching Authority hereby declares, according to Article 17(2)(a), that no international search report will be established on the international application for the reasons indicated below

1. ☐   The subject matter of the international application relates to:

    a. ☐ scientific theories.

    b. ☐ mathematical theories

    c. ☐ plant varieties.

    d. ☐ animal varieties.

    e. ☐ essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes.

    f. ☐ schemes, rules or methods of doing business.

    g. ☐ schemes, rules or methods of performing purely mental acts.

    h. ☐ schemes, rules or methods of playing games.

    i. ☐ methods for treatment of the human body by surgery or therapy.

    j. ☐ methods for treatment of the animal body by surgery or therapy.

    k. ☐ diagnostic methods practised on the human or animal body.

    l. ☐ mere presentations of information.

    m. ☐ computer programs for which this International Searching Authority is not equipped to search prior art.

2. ☒   The failure of the following parts of the international application to comply with prescribed requirements prevents a meaningful search from being carried out:

    ☐ the description   ☒ the claims   ☐ the drawings

3. ☐   The failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions prevents a meaningful search from being carried out:

    ☐ the written form has not been furnished or does not comply with the standard.

    ☐ the computer readable form has not been furnished or does not comply with the standard.

4. Further comments:

                  see further information sheet

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Form PCT/ISA/203 (July 1998)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 203

The present application contains 143 claims, of which 17 are independent, and at least 9 are in the same category, lacking a clear distinction because of overlapping scope. The plurality of the claims is drafted in such a way that they are not in compliance with the provisions of clarity and conciseness as required by the PCT. Furthermore, the description does not provide a reasonable basis for judging towards which part of the subject-matter the alleged invention is directed. In view of the above, it is difficult, if not impossible, to determine the matter for which protection is sought, and, consequently, the present application fails to comply with the clarity and conciseness requirements of Article 6 PCT (see also Rule 6.1(a) PCT) to such an extent that a meaningful search is impossible.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.